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Dangerous Beauty

How the freak of albinism handicaps life in the wild

By ARCHIBALD RUTLEDGE

Illustrated by R. Bruce Horsfall

GREAT personal beauty is desired by most women and admired by most men. It is supposed to confer the advantages of power. Yet, in the human realm, beauty has frequently proved ruinous to its possessor and perilous to others. It is often associated with tragedy, as history shows. Similar is the melancholy history of fabulous gems—of the Hope Diamond, the Star of India, and the Kohinoor. In the wide realm of Nature, too, beauty and tragedy often go hand-in-hand. Wherever there is spectacular loveliness, there is likewise the possibility of disaster. The sad history of the white egret well illustrates what is meant by a beauty too exquisite for its own good.

"THE COCK WAS OF STANDARD PLUMAGE; BUT THE HEN WAS A TRUE PRINCESS OF THE WILD—AN EXQUISITE ALBINO"

Most conspicuous are the wild creatures made startling in their spectral loveliness by absence of pigment. These are albinos, and they are by no means so rare as many suppose. True, they are not commonly seen; but that fact may in part be attributed to their extraordinary shyness. They know well that they are dangerously beautiful. If my long experience in the woods counts for anything, the albino is the most difficult of all creatures to approach. Apparently sensible of his own high visibility, he becomes preternaturally wary.

It appears that anything living may be an albino. While science attributes this condition to a lack of pigmentation, and to a consequent white color of the skin and the hair, plus so great a vascularity of the eye that it appears pink, yet the deeper causes are unknown. Albinos are found in all countries and in all climates. They are found on land, in the air, in the water. There are, of course, human albinos. While the white hair or feathers or scales, and the pink eyes, are the salient characteristics, I have found that the skin of an albino is singularly sensitive. A snow-white deer or hog is especially likely to be tormented by insects. In the old days the farmers of Virginia used to kill at birth all the white pigs in a litter, believing that they would never be hardy. However, experiments fail to sustain the supposition that any albino is weaker than a creature of normal coloring. Some albinos, wild and human, are of normal, and occasionally of superior, strength.

Under some conditions, albinism means high exposure; under others, it is perfect camouflage. I have seen a wild deer dappled with albino spots lying under bushes, with the checkered pattern of the leaf-shadows and the sunlight falling on him, and he was almost indistinguishable from his surroundings.

We know that Moby Dick was a huge albino whale.

We know also that the largest land mammal is subject to this freak of color. In India and Malay the white elephant is a sacred beast; and it is not difficult to understand why one should have a superstitious reverence for these creatures that appear, at least in their natural environment, like haunting and beautiful wraiths.

Sir Thomas Malory tells us that King Arthur in great excitement broke up a solemn meeting of the Round Table when he had word that a milkwhite hart had been seen in the forest near Camelot. I do not know whether the knights retired to pray or to prepare for the hunt. But from earliest times albinos have been regarded with awe, usually tinged with superstition. I have known several albino bucks that were permitted to pass hunters, who considered them apparitions. All my life I have taken a curious interest in these ghostly creatures, and have perhaps seen more than my share. I have observed perhaps twenty wild whitetail deer that were albinistic, or partly so. On Bull's Island, one of the famed Carolina sea-island group, there used to be a small herd of white deer, and several of these I watched on the lonely marshes of that semi-tropical wilderness. When a stag is pure white, he is indeed a startling looking creature; eerie and beautiful. His hoofs, however, and his horns, may be of normal color: the former, black, and the latter brownish.

Among the avian albinos that I have seen in Nature are a crow, a robin, a blackbird, an English sparrow, a field sparrow, a Cooper's hawk, a ruffed grouse, a mourning dove, a quail, a redtailed hawk, a vesper sparrow, and a goldfinch. Also, I have seen the deer, the weasel, the fox squirrel, the red squirrel, and the woodrat. I have also seen an albino rattlesnake, white brook trout, many white insects, and piebald frogs. It does not definitely appear that any one species is more subject to albinism than another; but I have seen more albinos of certain species. The sparrow family, especially the field sparrow, seems to have a tendency in this direction; but the numbers are so great that the relative chance for albinism is greater. I have three mounted specimens of the white English sparrow. They are, however, very different in the shade of color that their plumage displays. One is literally snowy; one is dusky white; and the third is a delicate cream color. It is said (but it would be difficult to authenticate this) that the robin outnumbers any other kind of bird in North America. I have seen a good many albinos of this bird; but in most cases they were a mottled white; very beautiful, however, with the chestnut and white blending.

Albinism is strongly hereditary; but the degree in the offspring seems to be delicately adjusted to the degree in the parent. During a recent summer spent at Fletchers, N. C., by great good fortune I discovered a pure albino specimen of bobwhite. My first sight of it was in early June. I was sitting on the porch of our mountain home when my attention was attracted by the high-pitched querulous chittering of a quail—the kind of note it gives when startled. Looking up, I saw two birds crossing the yard. They were mates. The cock was of standard plumage; but the hen was a true princess of the wild—an exquisite albino. Realizing that I had made a discovery worth while, I decided to try to keep the birds under observation, to determine, among other things, whether the young would inherit the mother's coloring.

After a search of several days, I discovered the nest in a grassy meadow near the house. There were fourteen eggs. Until the eggs were hatched, I saw the albino by herself only once. It was at this time that I began to notice that a bird so colored develops an unusual degree of shyness. It is not only more difficult to approach, but it is far more secretive than its normal fellows.

All fourteen of the quail's eggs hatched. My first sight of the young was on a clear slope between the house and the spring. As I inadvertently walked right into the family, the old male whirred off into the meadow. The female fluttered pathetically before me, feigning injury. The fourteen chicks crept with elfin wariness into tiny grass-tufts and beside an old stump. There was not a pure white bird among them; nor was there one of standard coloring. But all were mottled like little circus ponies! What a strange little fairy crew they made! Later, when they were learning to fly, they presented a curious sight.

I studied these birds until they were full grown; and I may say from this observation that a condition of part albinism may be outgrown. I saw it outgrown; for by October, only a few of the fourteen retained any white feathers. The birds that remained mottled were as strong and as large as the others. As we do not know the deeper causes of this condition, we cannot predict that a bird or an animal will be half-albino just because one of its parents is; and of course it is known that albinos often come from normal parents. There is some physiological mystery here that science has not yet quite solved.

To me, the most interesting thing about an albino, especially if it be an albino bird or mammal, and therefore naturally graceful and wary, is not its coloring, nor yet the scientific question of how the normal coloring happened to go into subsidence, but rather how, when a species is given a standard color by Nature, which in most cases is protective, it manages to survive when its color is conspicuously unnatural. In short, how do wild creatures, handicapped by embarrassing beauty, made singularly obvious by an almost artificial and radiant splendor, compensate in Nature's old ruthless environment for a self-exposure that is as unintended as it is flaunting? They have to do something about this perilous business of a glaring revealment. As I have already suggested, they appear to do so by developing extraordinary vigilance. There is no other living creature so alert and so cautious as an albino—unless it be a cripple. In each case a grave disadvantage is intelligently met and overcome. A cripple in Nature's wilds, knowing its deficiency, plays the game of life with extreme wariness. An albino, apparently conscious of its own dangerous self-disclosure, acquires a proportionate finesse in its power of speed, silence, immobility, and other forms of shadowy avoidance.

On the great delta of the Santee, which lies immediately

"WHEN A STAG IS A PURE ALBINO, HE IS INDEED A STARTLING LOOKING CREATURE; EERIE AND BEAUTIFUL"

opposite my plantation home, over a period of years I observed a pure albino red-tailed hawk. Hundreds of hawks of this and of kindred species winter on the delta; and those of standard color usually permitted me to approach to within about a hundred yards of them—they having thus nicely estimated the effective range of a shotgun. But the albino was different. He knew that he had to be. It was in vain that I tried to stalk him. He never permitted me to come within two or three times the distance allowed me by his fellows. And not only was he more shy; but in pursuit of food, he seemed to me to be more crafty and swift than the hawks of ordinary plumage. Whether this superiority was real or apparent, due to his presence as an apparition, I could not be certain. But is it not reasonable to suppose that not only was he more than commonly alert concerning his own safety, but also that his legitimate forms of prey would be more readily aware of, and more startled by, his sinister approach than they would be of ordinary looking enemies? We do not exactly relish being pursued by a spectre; and would not little birds and mice and frogs, in their own way, regard an albino as a kind of ghost? In Nature, anything that is different is always startling; and what could be more inconsistent than a harrier as snowy as a spirit? The beauty of this particular albino appeared to betray him, not alone to his enemies, but also to those to whom he himself was an enemy.

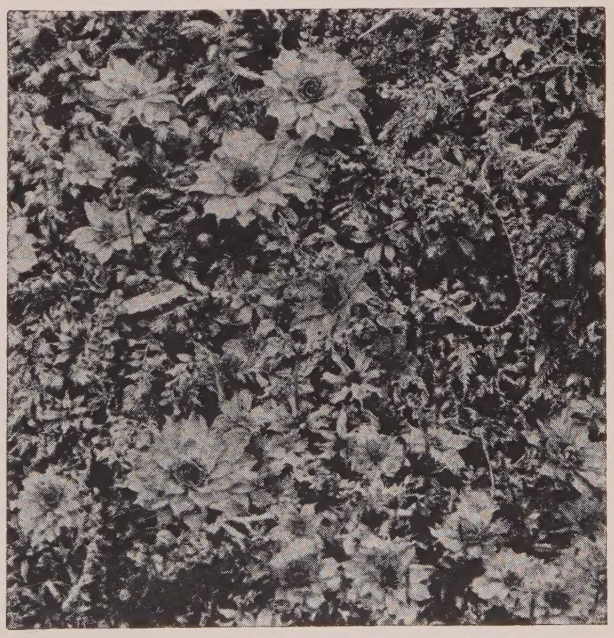
However, that the natural shyness of an albino may be overcome I have learned from the case of a little white doe that, though wild, became almost the pet of the hunters of the Path Valley deer country of Pennsylvania.

Seeing an albino always makes me feel that I am in the presence of some strange glory; and the opportunity may come to any observer. Unless an albino bird or animal has been located, and can be studied in the mating season and in its own limited range at that time, the next best time is during the autumnal or vernal migrations.

Mid-Winter Moss

By WILMER T. FOX

THOSE who travel the woods in mid-winter have opportunity to take pictures of some of our most interesting plants, for this is the fruiting season of many of our mosses. While rambling in Clifty Falls State Park, Indiana, in January, 1937, I took this picture of a moss. On that occasion the temperature was many degrees below the freezing point, but a few days earlier it had descended to far below zero. Yet here was this moss, seemingly as delicate as any fragile plant, with a sheen whose beauty no photograph can depict. At the time I did not know the identity of this hardy plant, but finally it was determined to be *Rhodobryum roseum*. The generic name alludes to the fact that the leaves that terminate the stem form a conspicuous rosette that has the appearance of a flower. There are many species. The range of this fine moss is in southeastern Canada and our adjoining northeastern states. It grows on rocks or decaying logs. A doubtfully valid form has been separated as *Rhodobryum ontarienses*.



Most of the fruits borne by the plants in this fine clump have fallen, but a few capsules are still visible. The picture shows the plant in about its natural size.

The Reindeer

By ERNST SCHWARZ

THE REINDEER is unique among deer in that the female, like the male, carries antlers, although they are smaller. It also differs from most deer in having young without spots, as we see in this photograph of a baby. However, the accompanying photograph of a young, domesticated animal is of a white individual, and therefore does not represent the normal color. The reindeer is the only deer that has become attached to man, and has been made into a domestic animal.

COURTESY OF THE BERLIN ZOO

The range of the reindeer (the name being here used in its broadest sense) includes the Arctic portions of both the old and the new worlds. In America it is called the caribou. It is found in Scandinavia, Spitzbergen, northern Russia, Siberia, as well as in Alaska, most of Canada, Greenland, and other Arctic islands. During the great Ice Age reindeer were forced much farther south. In France and Germany their meat provided a staple food for paleolithic man, and their antlers and bones the material for his tools and weapons. Some of the rock engravings left in the caves of western Europe by prehistoric man include beautiful representations of this animal.

In Europe, as well as in Asia and North America, reindeer undertake seasonal migrations. They assemble in vast herds that leave the northern feeding grounds in the autumn to pass the winter in the forests of the south where food is still accessible at that season.

As in prehistoric times the reindeer is a valuable asset to the inhabitants of all the countries where it now occurs. It provides meat, fat and leather. To the Lapps and certain tribes of northern Asia, who have domesticated it, it is the source of milk and the products derived from it. Reindeer from these countries were introduced to Alaska about fifty years ago, as an additional source of food for the natives. Lately a large number were driven to northern Canada, and smaller herds have been transplanted in other parts of the Dominion.

In Scandinavia, reindeer tongues are pickled and canned, and form an article of export to central Europe. During the World War these reindeer products were among the few articles that appear to have escaped the control of the Allied organization, and they formed an addition to the scanty diet of the starving population in Germany during the blockade.

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To a Blue Jay

By JOSEPHINE T. WALLIS

I know you're not a good bird,
And in melody you fail;
Your squawk is oft berated,
But, Oh—
That *tail!*

I know your disposition is
Unfortunately rough.
Your head is held too proudly.
But, Oh—
That *tuft!*

I see the saucy challenge
In your wicked, beady eye,
And I know I should not like you,
But—That *collar*
And *necktie!*

Not for worlds would I invite you
My canary—as he sings—
To meet, and share his hemp seed,
But, Oh—
Those *wings!*

I love you, naughty blue jay,
Though I love not all you do,
Your ways might well be mended,
But, Oh—
That *heavenly blue!*

THE NATIONAL CHRISTMAS TREE IN LAFAYETTE PARK IN THE NATION'S CAPITAL. IT IS LIGHTED CHRISTMAS EVE BY THE PRESIDENT OF THE UNITED STATES

WHEN THE CHRISTMAS TREE IS LIGHTED IT SENDS THE SPIRIT OF THE YULETIDE INTO THE ALLEYS OF THE CAPITAL CITY THROUGH CARS EQUIPPED WITH RADIO

"INTO THE BYWAYS"

By MAUD MACDONALD HUTCHESON

JUST WHEN the early darkness of Christmas Eve steals over the National Capital a tall evergreen standing in historic Lafayette Park becomes jewel-bedecked with colors of ruby, sapphire and emerald, and word that the President has "lighted the National Christmas Tree" is flashed over the air.

Through the miracle of radio the nation may share in the symbolic ceremony taking place opposite the White House—a program of such Yuletide music and carol singing as echoes over the country on Christmas Eve.

In the capital city of Washington itself this impressive tree-lighting ceremony has in recent years taken on added significance. When he touches the button that lights the National Christmas Tree the President thereby sets chimes ringing. These are picked up by radio-equipped cars in Washington's two hundred alleys, each community waiting to start its own program. These hidden places are the Capital's slums, which the Alley Dwelling Authority is pledged to wipe out by 1944. Each alley presents an individual problem and the reclamation of both property and tenants is going rapidly forward, but meantime there is urgent need for bringing beauty into the lives of their inhabitants.

"Unto us a child is born"—not only the Christ Child but all children, especially those in the slums that blot Washington's physical beauty. It is in the spirit of this belief that the Women's Council of the Washington Federation of Churches has, since 1936, organized a chain of community trees and candle-lit story hours on Christmas Eve. The programs, carried out simultaneously in Washington's two hundred inhabited alleys, form only one unit in a city-wide plan to deal with and prevent juvenile delinquency and arouse the interest and cooperation of the parents of these under-privileged children. The Women's Council of the Washington Federation of Churches has thus obeyed the Master's injunction to "go into the byways" and minister to the pressing needs of the people there.

On Christmas Eve, then, Washington's alleys are en fête—all arrangements having been mapped out months before by interested groups of helpers. Every one of these needy families is provided for—baskets of food, gifts of clothing, toys and other presents being distributed—and the alley dwellers have been encouraged to contribute something of their own to the programs. It may be a play, a pageant, or perhaps tableaux, based on the story of the Christ Child.

Always engaged in good works, Mrs. Roosevelt has taken a personal part in these Christmas Eve celebrations. Slipping away unnoticed from the crowd that watches the President light the National Tree in Lafayette Park, she comes to one of the alleys to tell the Christmas story and

IN ONE OF THE POOREST PARTS OF THE CAPITAL, ETTA MAI RUSSELL HAS CHOSEN TO MAKE HER HOME AMONG THE PEOPLE WITH WHOM SHE WORKS. AND IN HER TINY GARDEN SHE HAS SOUGHT TO BRING THE THOUGHT OF NATURE AND BEAUTY AS AN INSPIRATION TO THE MANY WHO DWELL IN THE ALLEY-SLUMS OF THE FEDERAL CITY

join in the carol singing. Two years ago she rendered this fine service in Navy Place—an alley lying in the very shadow of the Capitol dome. It is shaped like a cross, the only one in the city having such a form.

Some indication of the response that this work is meeting may be gained from this letter:

"I heered about your xmas trees and singing in the alys last yere and am sittin down writin to you know we air livin in one of these alys.

"Now my ole man and me air gittin ole and lettin you know we can't have a tree caus we aint got no money to get no dicratins so we would enjoy lookin outin the winder Xmas to see one.

Our names air,
John and Mary."

The alley Christmases, however, are only part of the year-round program carried out in these communities under the able and sympathetic leadership of Etta Mai Russell, who represents the Protestant churches of Washington at the Juvenile Court. To the remarkable results that she is achieving among the children brought to the Juvenile Court she brings a rich and varied experience gained in different phases of teaching and social service. Teaching to her, however, is never *telling*. It is good to know the Creator through His Word, but even better to find him in His World. To a child, especially, the experience can be more arresting, enabling him to build up a house of refuge within himself.

Every child coming before the Juvenile Court is in conflict with society and in need of readjustment to his fellows. He is therefore first listed with the church of the denomination of his choice. The one nearest his home is selected, the pastor's interest enlisted, and in many cases an entire family has been won back to the fold through some young member brought before Judge Fay Bentley of the District Juvenile Court.

The work carried on by Etta Mai Russell with Washington's delinquent and pre-delinquent children includes such established social aids as summer camps and vacation classes, and even a toy-lending service, but the latest and most interesting experiment is the alley window box program. Its purpose goes much deeper than mere decoration of these slum spots.

In appealing to more fortunate folk to share their gardens "that all might know beauty," Miss Russell last summer requested seedlings for window boxes that the children helped her plant. They were then distributed in the various alleys where they have transformed drabness into glowing color. And here is where Nature does effective teaching. By working to create beauty the children come to know a God who has made His World a place of wonder. The potentiality for beauty wrapped in the tiny seed is brought home to them, and fulness of life explained in the magical flowering of a plant.

To bring beauty into the squalid homes of the alley children, rather than to alienate them from their surroundings, is the purpose of this church worker at the Juvenile Court. In many cases she has had the satisfaction of seeing adults influenced to put their meager resources to better use and help in the clean-up campaigns being carried out by the children.

Of course, before accomplishing much among the children who are entrusted to her care, Miss Russell must first come to know them and win their confidence.

For the past three years she has been making such acquaintances through her alley story hours. She goes into one of these dingy places, gathers a group about her and, frequently sitting on the cobble stones, dips into a vast fund of stories—stories dealing with Nature and the vast outdoors, Bible and wonder tales, character-building and just-for-fun stories—she knows all kinds.

One spring dusk as she finished speaking to a crowd of spellbound youngsters a teen-age boy came up and somewhat awkwardly put a hand on her shoulder. "I didn't know who you were when you came into the alley tonight," he said. "I thought you were just a lady."

As the basis of her excellent and successful work Etta

Mai Russell has chosen pertinent paragraphs from the celebrated Children's Charter, drawn up as the result of a White House conference on the needs of the nation's children, held during President Hoover's first year.

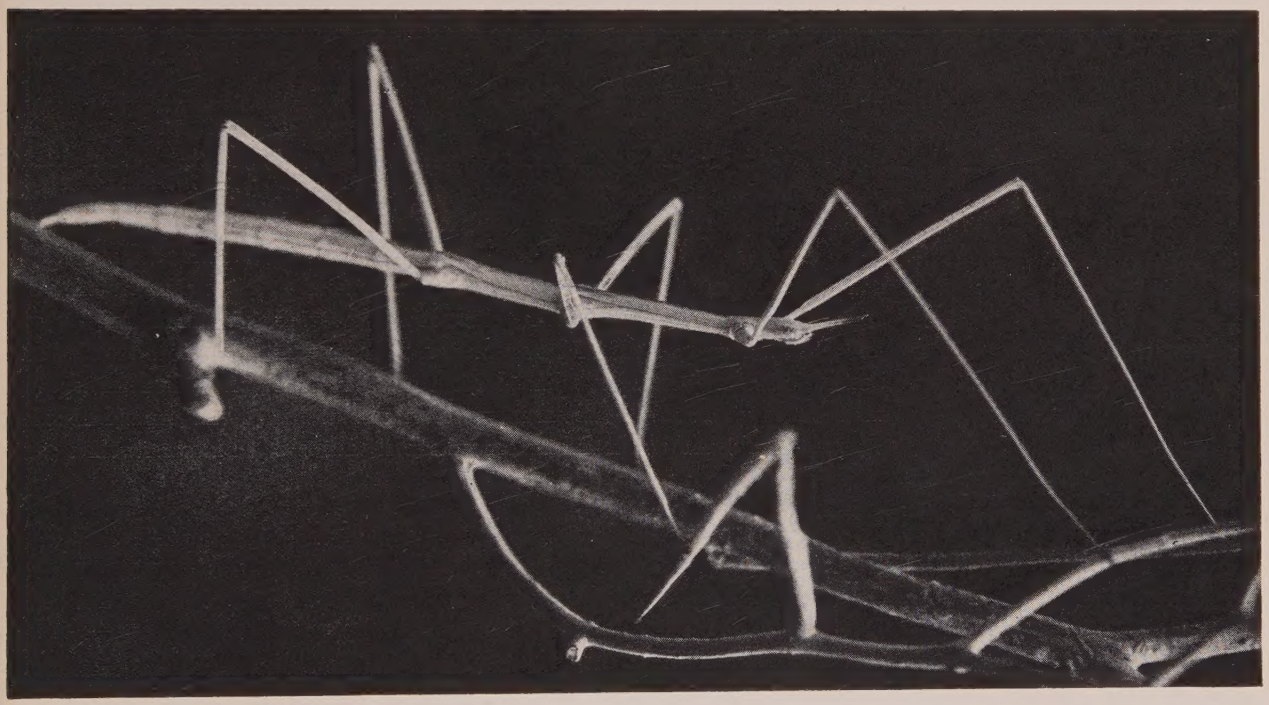
"For every child who is in conflict with society, the right to be dealt with intelligently as society's charge, not society's outcast; with the home, the school, the church, the Court and the institution when needed, shaped to return him whenever possible to the normal stream of life. . . .

"For every child these rights, regardless of race or color or situation, wherever he may live under the protection of the American Flag."

"The Juvenile Lady," as Etta Mai Russell is known to many of the children, has recently made a home out of a renovated store in Southwest Washington, just a block from the Potomac. The interior is furnished with rare charm and exquisite taste, and what was an ash heap has been transformed into a tiny garden that is already the district's beauty spot. The fence has been made semi-circular at one point so that a few flowers and a bit of green abut the sidewalk for residents of the poor neighborhood to share. Despite the gloomy prophecies of friends, not a blade of grass has been harmed!

Etta Mai Russell has chosen to live in this unfashionable quarter of the Capital so that she may show her neighbors that Nature may be enlisted to create beauty out of the materials at hand—no matter how scant or unpromising. Nothing of her own is costly yet her place is like one of those pictures found in the home and garden journals.

She has shaped all her programs herself—alley story hours and sewing classes, vacation Bible schools, summer camp, toy-lending, Christmas Tree services and alley window boxes. The next phase, Miss Russell hopes, will be open-air movies, shown on the whitewashed wall of her house, for the folk among whom she has taken up her abode are often without means for necessities, let alone money for entertainment.



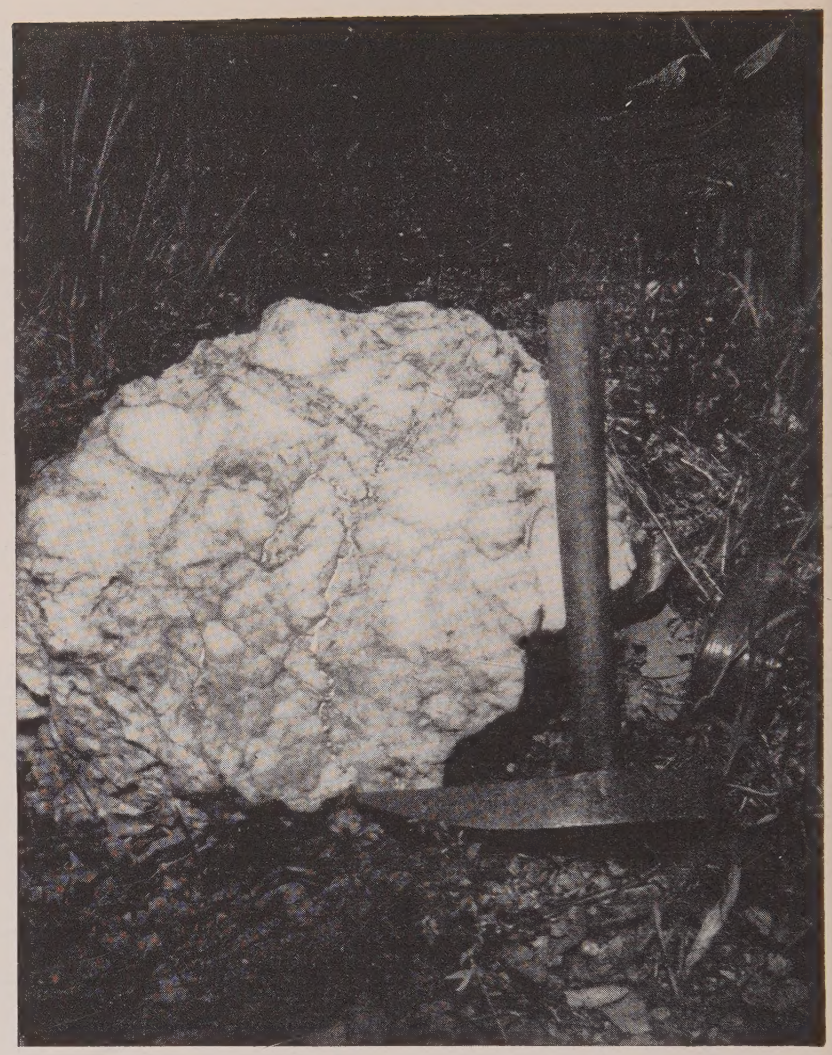
Desert Houdini

By LEWIS and MARIAN WALKER

A WARM, gentle wind was blowing, full of the perfume of the desert sage. All about us was a cacophony of sound as myriad tiny creatures sang their odes to summer. The deep-blue mantle of night had just settled upon the Borego Desert in Southern California. As we drove slowly along the black ribbon of pavement, so alien in color to the desert about us, we passed over occasional twigs and straws, and now and then a desert snake would cross.

Suddenly a "twig" that we had been watching gently lifted itself about an inch above the highway, and with stately, measured tread stalked away. With the aid of flashlights we examined this desert Houdini. It was a walking stick, *Diapheromera femorata,* widely distributed in this country, but rarely seen in the desert.

As we followed its course across this man-made "no-man's land" of asphalt, it was conspicuous white on black! The moment it reached the edge of the pavement, however, it simply melted away. It was so nearly invisible that we could hardly follow its course to a silvery-gray smoke tree—leafless, thorny and angular. As this living twig wended its way among the branches, it seemed to be just another branch gently swaying in the wind. It was the superlative of protective coloration and form. The angular legs, which are replaceable if damaged, duplicated the jointed thorns of the smoke tree; the thicker body perfectly matched the heavier limbs. The slightest tap on a twig, as of a bird landing, brought about complete and instant rigidity. Walking stick and smoke tree, all one. Nature in the desert, master of camouflage!



NATIVE GOLD IN THE FISSURES OF THE MOTHER QUARTZ

Note the seam of gold running upward through the stone from the point of the miner's hammer

Nature's Gold

The story of the precious metal that has changed men and nations, both by the wealth it represents and by the lure of its rare natural beauty

By ALFRED ELLIOTT GAUMER

TO THE average individual, gold symbolizes the satisfying of a multitude of desires. Virgil says: "To what dost thou not compel the minds of mortals, thou accursed hunger for gold?" In our modern life it is known as the standard of a monetary system (or to be buried in Kentucky), a good and attractive watch-case material, or an appropriate foundation for a diamond or other gem.

Few are those who have had the opportunity of becoming acquainted with this element as it occurs in its native state. There it is beheld in a setting suitable only for the most royal of metals. Whether gold occurs as smooth, water-washed nuggets, grains in an alluvial deposit or threading its way, as a vein, into the heart of a mountain range, its story in Nature is one of never-ending, ever-changing fascination.

Probably the most spectacular thing about this most widely sought of all metals is its effect upon that enigma—human nature. It is an actual fact—for I have tried it—that if two specimens, one of raw platinum and another of gold, be exhibited to a layman, the rare and more costly platinum will be laid aside after a short examination while the gold will be scrutinized and fondled as though human flesh had some queer magnetic attraction for it. No other metal holds the allure of gold. It is this, and not alone the pursuit of riches, that causes the prospector, even though his eyes may be dimmed and his beard white, to bury himself in deep and silent canyons and cross untrod summits on his Argonaut adventure.

The artist, using both pigments and words, has tried to describe gold. "As warm as a woman's yellow hair," it appears to one; to another it was "as cold as the yellow glare of the full moon upon the arctic snow." Gold is not bright and shiny, neither is it dull or gleaming. But, like the sunrise and sunset, it beggars all description.

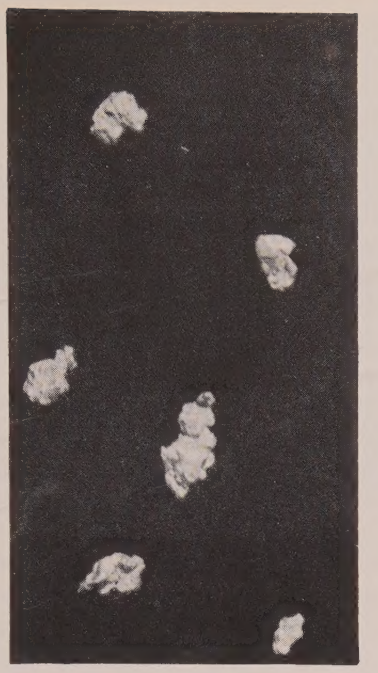
Quartz is the mother of gold. This rock, of metamorphic origin, is generally the cradle of natural gold. Quartz occurs in numerous colors and forms. As rock-crystal, it is colorless, and in most cases a six-sided prism terminating at the end with a six-sided pyramid. As amethyst it is a delicate violet hue. Rose, blue, yellow, green and other vivid colors of the spectrum are found as mineral tints in this matrix of gold. The gold itself occurs in crystals with eight and twelve plane faces, without cleavage. It also comes in strings, thread-like, web-like, in grains, thin layers and masses.

During the metamorphic changing of the earth's surface, fissures of varying widths appeared. In these fissures, solutions and vapors containing silica were deposited. The gold must have entered these fissures as a vapor. There it cooled, sometimes in forms resembling ferns, trees, or leaves, not unlike the fanciful scenes in a moss

agate. After these had become solid, vast uplifting and disturbances tilted the veins at all angles.

When geological conditions were favorable, the gold formed what is known as "pockets". Masses of the precious metal weighing several hundred pounds have been found in these pockets. When a pocket is discovered in a quartz ledge, the miner is privileged to view, by the dim light of his miner's lamp, a never-to-be-forgotten sight. Here, with the natural white or colored quartz as a setting, gold is incomparably beautiful. It almost seems wrong to dynamite it from its frame, crush it from its mother quartz, and subject it to the further processes of extraction until it reaches the smelter or mint.

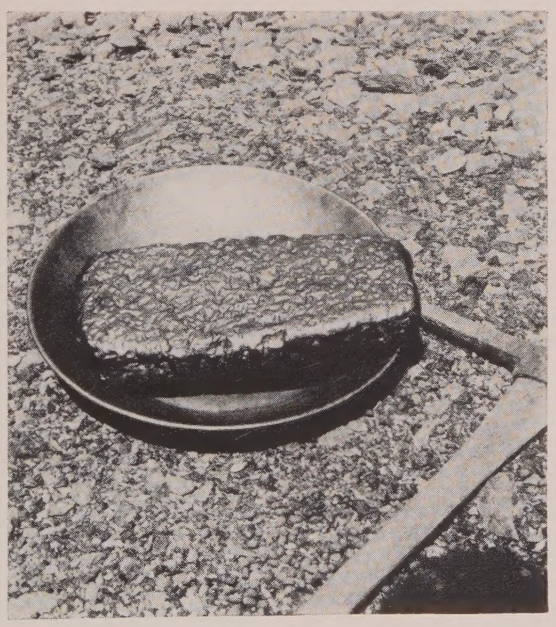
I have seen pocket gold that appeared to be a tangled mass of wire interwoven in the porous material of the vein. Still other deposits look as though a bucket of molten gold had been splashed upon the white quartz.



GOLD NUGGETS TAKEN FROM FEATHER RIVER

(Below) A replica of the Willard Nugget, showing its size. This was discovered in a glacial deposit in Butte County, California, in 1859

From the ledge, or vein, the gold is transformed into an infinite variety of shapes, being easily beaten or drawn out, and lends itself readily to the touch of erosion, the master sculptor. Perhaps of more renown is gold as it is found after it has left its mother ledge and has become in miners' language "nuggets 'n' dust". It was in this form that Marshall discovered gold in California. It was placer gold, found under a lone birch tree on Bonanza Creek, that sent a mad scramble of humanity into the Klondike's anything but gentle grasp. We find gold in more or less a free state in alluvial deposits. Throughout centuries of exposure it remains untarnished. And, like snow flakes, no two nuggets are alike. The infinite variety forbids repetition.



After erosion has carried the grain of gold down the mountain side and into a creek or river, any rough edges are worn off. This makes for finer gold, and this process goes on until the metal becomes so finely ground that it hangs in colloidal suspension—minute particles floating in water. Gold may be so fine that it loses the characteristics that distinguish it. Colloidal particles of gold vary in color from a brilliant red, through purple, to black, depending upon the size of the particle. The ocean waters contain a vast quantity of this type of gold, but it is, naturally, very widely distributed.

On its journey toward the sea another phenomenon occurs. It is often heard, but seldom believed, that "gold grows". Yet this is an actual fact, although it does not grow as one might imagine. What happens is that a nugget, or sizable piece of gold, being much heavier than the gravel in the river bed, settles to the bottom and becomes lodged in a crevice of the "bedrock". If the crevice is deep enough to "hold the gold" the nugget will remain there until the river becomes swollen and agitated enough to sweep it from its resting place. In the meantime finer particles, or "colors" of gold, will come to rest in the crevice with the nugget. An ever so slight movement between a bit of "color" gold, resting in contact with a nugget, causes minute particles of gold to wear off from one or both. This acts as a cement, and, in time, if they are not separated, the two individual particles become one.

I have seen nuggets that, when viewed under a microscope, were covered with tiny warts that could easily be identified as other particles of gold fused to the nugget. Some of these tiny bumps were of a different colored gold—another aspect of Nature's versatility. Some gold, when found in the natural state, is very light-colored, while another specimen from a different locality may be a deep, almost orange color. This is the result of other metals being fused or alloyed with gold by Nature. Silver alloyed with the gold results in the varying degrees of paler color; while copper gives it a reddish cast or a deeper color. Pure 24-carat gold is seldom, if ever, found in Nature. The term "carat" should not be confused with the similar term that is applied to the weighing of gems. Eighteen-carat gold contains eighteen parts of pure gold and six parts of some other metal. The other metals are alloyed with gold to make it more durable. Such was the case with the former United States gold coins, which were ninety percent gold and ten percent copper.

Placer gold, or gold from an alluvial deposit, is one of the most fascinating forms of this precious metal. Many are familiar with the histories of the big nuggets of the world. Because of their great worth, their fame has

spread far. But comparatively little is known of the more beautiful specimens of placer gold that have been discovered from time to time in all corners of the earth. I was privileged to see one of these nuggets. It was discovered in the Feather River mining district, north of California's mother lode. This nugget contained approximately five ounces of gold clustered like nuggets in the frosty opalescence of crystalline rose quartz. It was, without a doubt, one of the most beautiful specimens of gold ever discovered. Since that time I have tried to locate it, but it has disappeared, without doubt having been sold to the mint for the few dollars of gold it contained. Such masterpieces of Nature should be saved.

Geological conditions the world over have been responsible for the numberless variations in the habitat of natural gold. Glaciers have gouged out enriched veins and deposited the crushed remains many miles away from their former setting. Gold that originated in Alaska, because of this activity, has been found as far south as the United States.

Volcanoes, active during the Tertiary Period, say sixty million years ago, buried gold-bearing river beds beneath great blankets of lava. After the modern rivers have been stripped of their riches, the miners turn to conquer the "ancient channel". There they gouge out the gravel and gold that for untold ages has been hidden from the sunlight. Here the miner may encounter sections of the ancient river that are particularly rich. Chunks of gold ranging from the size of a pea to that of a lemon are found filling the cracks and "potholes" in the river bottom. When a condition like this exists, another trait of man, and gold's effect upon him, are revealed. Miners are not more dishonest than any other group of men, and, as a rule, they would not steal a penny from their employers, yet "high-grading" in a gold mine of this type is an inevitable temptation if precautions are not taken.

Gold-bearing ores often contain no gold that is visible to the eye. Such is the case when it occurs as tellurides, or associated with iron or copper pyrites. The pyrites are crystalline compounds of iron and sulphur, or copper and sulphur, and are often mistaken for gold. Hence they have come to be known as "fool's gold". This title, however, is a misconception, for the pyrites often are enriched with the variety of gold that is sought by those who are anything but fools. True, too, is the old adage, "All is not gold that glisters." Many are the prospectors who have believed themselves to be rich only to find that they had discovered a source of pyrites, worthless save for the manufacture of sulphuric acid.

Through all ages, from the time the Incas wrested from Nature's stronghold this precious element to beat it into ornaments, until man ceases to populate the earth's surface, gold remains all powerful. And it should be appreciated, as are the trees or the flowers, or the hills or deserts from which gold comes, not merely for its intrinsic value, but as a gift of natural beauty.

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SCREW PINE

By HUGO H. SCHRODER

A STRANGE tropical plant sometimes attaining tree size in Florida is the screw pine, *Pandanus utilis,* which in its native Madagascar may reach 60 feet in height. The base of the plant is held up on stilt-like aerial roots that grow in a cluster. The long sword-shaped leaves grow up to three feet in length; they are grouped in a spiral twist, quite different from the average leaf arrangement.

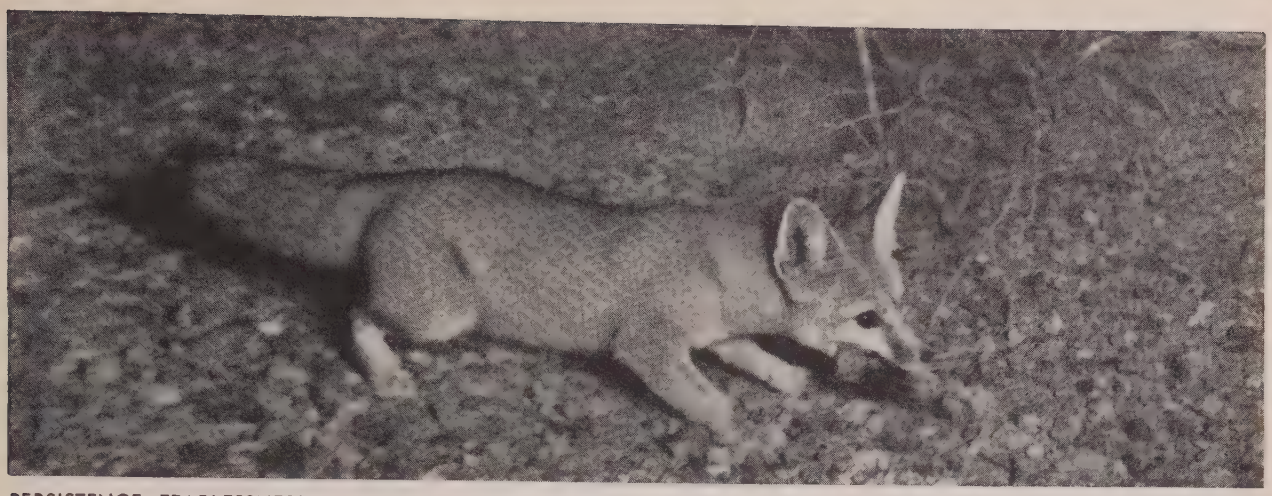
This plant, as well as other forms of *Pandanus,* is extensively grown as a pot plant for home decoration; and conservatories, able to take care of good-sized plants under glass, show various species to good advantage. Some varieties have striped or variegated leaves, while others are unmarked

It is called screw pine because of two different characteristics: the spiral twist of the leaves is responsible for the first half of the name, while "pine" was adopted because of the resemblance of the fruit to a rounded pine cone. These fruits grow to a diameter of six inches or more. About a dozen fruits may be seen in the photograph.

In its native regions the plant is useful for various purposes. The fruits are eaten for food; the fibre of the roots and leaves is used for making hats, ropes, baskets, bags and matting, and paper is made from the leaves.

IT ISN'T A PINE

But it is so-called because of the resemblance of the fruit to a rounded pine cone. The spiral twist of the leaves is unusual in Nature



PERSISTENCE, FEARLESSNESS AND SPEED THE FOX HAD IN PLENTY

After the bait had been set and before the focus of the flash camera could be checked the little night visitor would try to make off with this temptingly placed nocturnal snack

KIT FOX AND CAMERA

By LAURENCE M. HUEY

Photographs by the Author—and the Fox

AN OLD prospector who had spent half of his life on the desert once told me that a desert swift, the animal more commonly known as a kit fox, would steal the bacon from beneath your pillow. At the time this statement sounded a bit exaggerated, but not long ago I had reason to remember the old fellow's words and to realize that he was not so far wrong after all.

Four of us were collecting museum specimens and our camp was located amid a sparse growth of creosote brush on the open desert about ten miles south of Gila Bend in southwestern Arizona. It was the first week of February, and while most of the days were clear, the cold north winds swept down from the distant snow-clad mountains with chilling temperature after sunset. Then the most comfortable place was in our sleeping bags and we sought them early. This gave ample opportunity for visits from an elusive nocturnal guest—a kit fox.

It was not bacon, however, that the kit fox sought. It was the tin can in which I put the skinned bodies of the mammal specimens I had prepared during the day. Nor was it under my pillow, but just outside the tent, left there until there were enough refuse to bury.

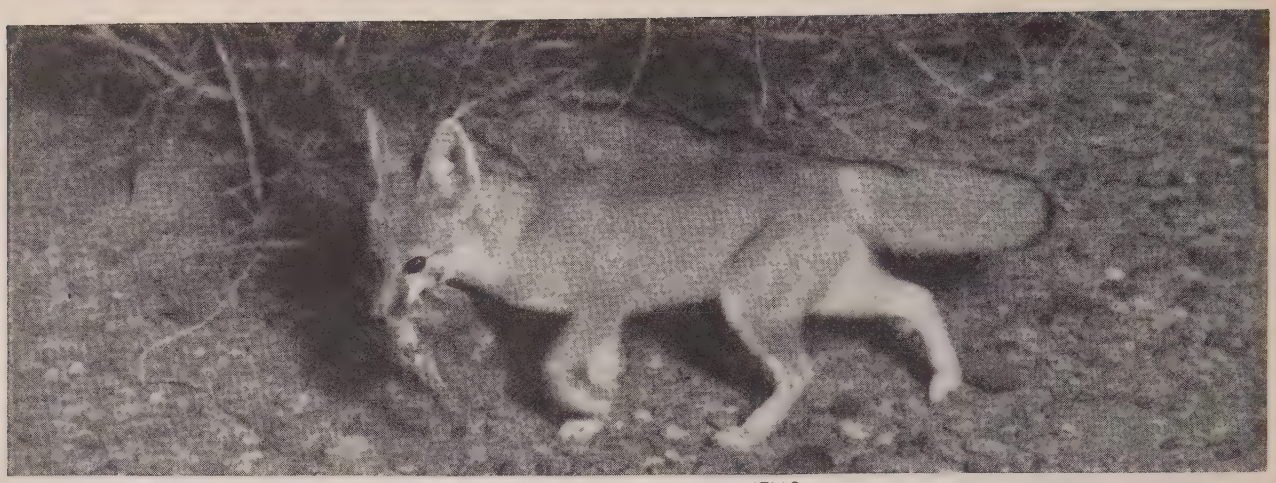
The first few times this silent-footed fox came I did not know he had called except that the can was twice mysteriously missing. Puzzled by its absence, but not giving the matter much thought, I would get another from the garbage pit. When the third can had disappeared I was certain that some animal was the thief.

The identity of the culprit became known when I found one of the cans about a quarter of a mile from camp. Around its top were tiny sharp-pointed tooth marks where the kit fox had worked to lift up the lid left by cutting open enough of the can top to bend it back. This had been pressed in on top of the mammal bodies when I had finished my work, and had given the little fox considerable trouble to pry it open again.

Returning to camp I set and baited my flash-trap camera, placing it about fifty yards from the tent. About eleven-thirty that same night it was sprung. The report of half an ounce of extra-high-speed flash powder confined in a wax-sealed box was terrific. We all awoke, but it was late and I was too comfortable to get up and change the plate and reset the camera. Next morning the can was missing. For four nights this same thing happened. Finally the climax came. We had only settled into our sleeping bags when there was a click of teeth on tin as the fox again made off with the can. A few minutes later the flash camera went off. Since it was only eight o'clock I dressed and reset the camera. I had just put out the light, and was pulling my blankets over me, when, "BANG", the flash was fired again.

We were all awake and there was much speculation about how our visitor felt about all these fireworks. I relighted the lantern and again went out to reset the camera. This time I saw the fox leave the vicinity of the camera as I came up with the light. It had taken the bait, but there were a few kangaroo rat specimens left on the skinning table. One was tied to the fine trip wire and anchored as before. Just to make certain of my focus I set the lantern where it would cast a strong light on the bait. Stepping back of the camera, I put the focusing cloth over my head. To my astonishment, on the ground glass I saw the little fox come dashing in after the bait. I had to jump at him to save it. Twice he came back while I was focusing, and finally it took a rock to frighten him away.

His fear did not last long for I had been back at the tent only a moment when the flash was fired again. When



THE FOX SEEMED TO ENJOY A CROSS-COUNTRY CHASE WITH THE AUTHOR

He ran with agile beauty, his legs moving swiftly like the whirring spokes of a rapidly-moving wagon wheel, and with a lack of effort that was beautiful to watch

I went to reset for another shot, the fox did not even run away but went leisurely around to the other side of the creosote bush I was using for a background, sat down on his haunches and watched me replace the bait. His eyes blazed in the lantern's light when he faced me, and again he tried to seize the bait before I could check the focus.

Picking up the lantern, I started to chase him. The little fellow seemed almost fearless and kept only a few feet in front of me. However, I could never get quite within grabbing range. He never seemed to forget the food that awaited him by the camera, and twice our chase brought us back to it. I was amazed at the speed and agility of the little "critter". His soft padded feet fairly shimmered in the lantern's light as they carried his lithe body. There was hardly a noticeable motion along the line of his back. The movement of his legs reminded me of the whirring appearance of the spokes of a rapidly-moving wagon wheel. His footfalls were absolutely inaudible as he sped along over the pebbly desert malpais.

Six times in one hour and twenty minutes the little fox fired my flash light camera, exhausting my supply of flash powder cartridges. Despite my fox-chasing exertion, the cold wind had so thoroughly chilled me that I lay awake an hour or more before I was warm enough to sleep. As I shivered I thought of the old miner who had told me the bacon story. After all these years I had found proof of his yarn, and now believed it.

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A Hardy House Plant

By VICTOR H. RIES

MANY of us have grown the little house plant that is called, because of its habit of growth, the strawberry begonia. The strawberry part of its name comes from the numerous runners that produce new plants just as with strawberry plants. It is also called strawberry-geranium. The begonia part of its name is probably due to the superficial resemblance in its foliage to the begonia. Actually it is not a begonia but a saxifrage, *Saxifraga sarmentosa*—or mother of thousands—a native of China and Japan.

When kept out of doors for the summer, this plant is usually brought indoors before frost. And yet the accompanying photograph was taken in the writer's garden in Columbus, Ohio, where this colony has been growing on a large pocketed limestone rock for several years without any protection. It survived 22 degrees below zero in 1936.

The green and silvery-white leaves are attractive throughout the season, while the airy heads of white flowers make it doubly fascinating in spring. So why not plant yours out, preferably in a little shade? You will find it will multiply and spread, and will be hardy.

WHEN PROSPECTORS FIRST SAW THESE THEY CALLED THE PLACE "CATHEDRAL CITY"
But man had no part in its making, and although early visitors wandered awed among these strange formations they could find no evidence of how Nature had been the engineer

The Ghost City of the Algae

By JOHN FAWCETT

FAR OUT in the wastelands of a California desert is the strangest ghost town in America. It is not one of the usual western ghost towns built in the booming days of the Forty-niners—in fact, it is not a relic of man's work at all. It is a ghost town built entirely by tiny plants, countless ages ago!

Rising high above the level desert floor, the towers of this strange town form a skyline as impressive as that of the most modern man-made city. Many years ago, when the first prospectors wandered into this region, they gazed with astonishment at this unexpected sight. "It's a mirage city," they said. "A mirage city of cathedrals!"

But closer inspection revealed that the skyline they saw was real—that those strange towers and cathedral-like forms were built of solid stone and earth. Awed by its mystery the prospectors walked among the huge structures and tried to find a logical explanation for them. It was apparent that man had had no part in their construction—but there seemed no evidence to show what act of Nature was responsible for their formation.

Word of this strange "Cathedral City" soon filtered through the mining camps. The region began to be marked on maps with the more prosaic name of "The Pinnacles". Curious travelers, on their way to the gold fields of Nevada, began making side-trips to the high desert basin, between Death Valley and the Sierras, where "Cathedral City" was located. But no one was able to answer the question—"What caused these mysterious formations?"

Eventually, stories of "Cathedral City", or "The Pinnacles", reached the ears of scientists in California coast towns. Small groups of them began making trips out into the desert to match their technical knowledge against the silence and mystery of the cold, stone city. At first they were as puzzled as the humblest of the prospectors. The formations were utterly unlike anything they had encountered before.

Their first step was to analyze the material of which the formations were made. To their surprise, they found that the pinnacles consisted of uniformly pure calcium. It was of a type that indicated organic origin. With this as a starting point, they began to investigate further.

A few miles north of the pinnacles, in the lowest part of the desert basin, the scientists found an immense deposit of salts, known to desert men as Searles Dry Lake. Searching in the vicinity of the salt beds, they found a few fossilized bones—bones that proved to be the skeletons of large fresh-water fish! Then, in the mountains surrounding the basin, they found—600 feet above the valley floor—traces of what unmistakably was an ancient beachline! From these evidences, the scientists soon realized that the desert basin was nothing more than the dried-up bed of a tremendous, prehistoric, fresh-water lake!

Tracing the course of the ancient stream bed that had fed this lake, the scientists found that it led to a whole series of similar dried-up lakes. These lakes evidently had all been fed by the melting snows of the high Sierras in an age that had been much colder and wetter than now. Apparently, as the climate had changed, probably due to the retreat of the last great ice masses, the snow runoff had ceased and the lakes had gradually dried up. The northernmost of the lakes—Owens Lake—was found to be still in the process of drying-up. By measuring its rate of shrinkage, scientists were able to calculate that the chain of lakes had been at their height approximately 35,000 years ago.

They knew then that their search for the origin of the

WORD OF THIS STRANGE DESERT "CITY" SOON REACHED THE EARS OF SCIENTISTS
Studying the formations, they found that they were almost pure calcium, and from this clue they discovered that some 35,000 years ago tiny algae had been building monuments beneath a lake

pinnacles was rapidly narrowing. What they must find was some organism that lived 35,000 years ago, and that was capable of building giant towers of calcium 600 feet below the surface of a fresh-water lake!

Soon, in the field of botany, they discovered the answer. They found that the builders of those great stone towers were the smallest of known plants—the tiny blue-green algae.

This junior member of the seaweed family, they found, had an appetite far out of proportion to its microscopic size. Its greatest need was for carbon dioxide—as necessary to members of the plant family as oxygen is to man. In order to obtain this life-giving chemical, the algae absorbed calcium hydroxide carried in the waters of the ancient lake, and extracted from it the carbon dioxide. The residue of calcium was then precipitated in masses, which grew slowly but surely with the years. Like great coral reefs, these submerged masses grew until they reached gigantic proportions.

As the years passed and the level of the lake was lowered, these submarine towers must have begun to appear above the surface of the water. At first appearing only as tiny dots near the southern shore, they were exposed more and more as the waters receded around them. At last, when the level floor of the lake was finally left dry, these strange crags of purest lime loomed to their full height in the desert air—impressive monuments to the memory of the dead lake and the vanished garden that surrounded it.

This, then, was the answer to the mystery of "Cathedral City". Tiny algae had built these mighty towers in bygone ages when the desert floor was covered with more than six hundred feet of cooling water. The smallest denizens of the lake had left the largest reminders of its existence!

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Ruby-Throated Hummingbird

By HARRY ELMORE HURD

So brave a flyer, yet one finger-length
Would measure him; so small a bird, yet strength,
Synchronized with bronze-green beauty, brings
Confusion to his foes. His purple wings
Resound like sawteeth buzzing through a knot
As he patrols his private garden plot,
Eager for combat. The ruby at his throat
Outflames the fire of phlox: he seems to float
In air, attaining the paradox of flight
Without progression. Fearing that blurring night
May fall before the azure of the flowers
Can be explored, he flashes through the towers
Of silent larkspur, probing each nectary
In quick succession. Woe to bird or bee
Who dares dispute with him—as well to fight
With thrusting time, or parry sabered light!

In Forests of Hair and Feathers

Where insects live in virtual darkness and are adapted to their environment

By G. F. FERRIS

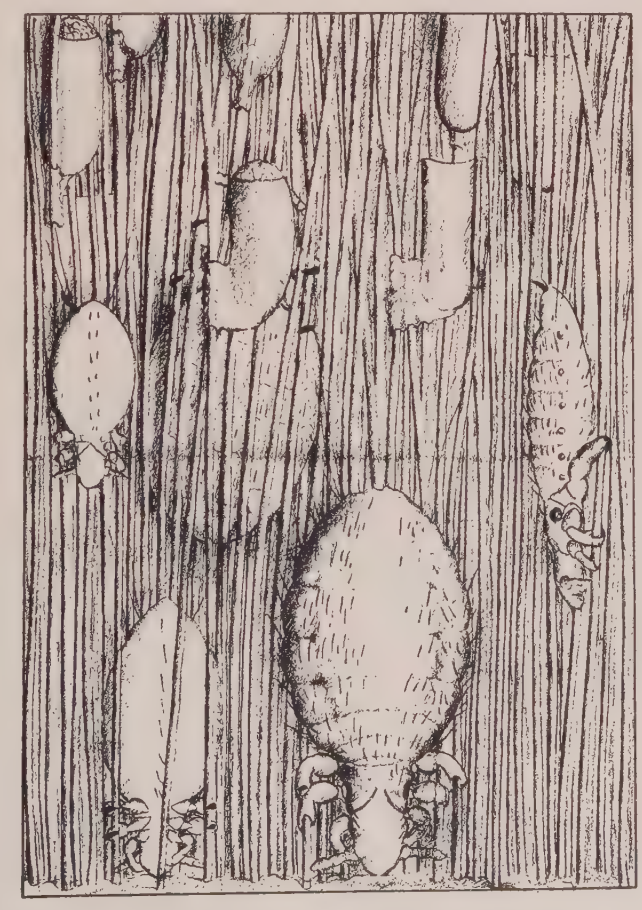
Out of the hundreds of thousands of species of insects and mites that have been recognized and named, there are a comparatively small number that live at some portion of their lives in the peculiar surroundings furnished by the hair and feathers of living mammals and birds. Such species are called ectoparasites, meaning merely that they are parasites that live on the outside of the bodies of their hosts. We say that there are comparatively few species of such ectoparasites, for they constitute only a minute fraction of one percent of all the insect and arachnid species. Yet, actually, there are many of them, for there must be nearly five thousand species now known.

These ectoparasites belong to a number of diverse groups. There are ticks and mites of many kinds, fleas, bedbug-like species, flies, a few beetles, two large groups of lice, and there are a few peculiar and rare forms that have no common names and which even most entomologists have never seen. All of them are strange beasts. It is perhaps difficult for the non-scientific observer to think of them as anything but "disgusting", but this is a word that has no proper place in scientific vocabulary. Neither should they be characterized as "degenerate", for that is another word that the careful biologist will avoid. They are the perfectly normal and highly specialized inhabitants of a highly specialized environment. Because of this many of their peculiarities of structure and habit seem to have arisen, and it is in their relation to this environment that they are most interesting.

If you can imagine yourself reduced by some magic to a height of perhaps an eighth of an inch and dropped into this peculiar environment, let us say on the back of a dog, what would you see? Actually, you would be able to see but little, for you would be practically in darkness. So we shall have to assume that you are dropped into a spot where the dog's hair is thin enough to let some light through to the skin. Essentially, you would find yourself in a forest. Slim, flexible shafts stand all about you, set so closely together that you could not pass among them without bending them aside. They tower above you, straight or perhaps strongly inclined as if blown down by a hurricane. In the thickest of it scarcely a ray of light penetrates to the floor. But it is almost tropically warm and from one year's end to another the temperature varies little. Beneath the floor of this "forest" flow streams of the richest food material, needing only to be tapped. It is an ideal world to those animals that can adapt themselves to its peculiarities. Always warm, safe from enemies without, and with a supply of food that ceases only when the world comes to an end with the obliteration of all its inhabitants. The forest of hair!

Similar, also, would be the situation if, in your reduced form, you were dropped upon the body of a bird instead of a mammal. Only here the character of the forest would be different. There would be giant palms with tremendous trunks and stiff, closely inter-laced branches, together with smaller, more delicate, fluffy undergrowth. The temperature would be even more tropical, and, possibly, more constant than upon a mammal. The forest of feathers.

It is in terms of such surroundings that one must think when considering the peculiarities of the animals that have their abodes on the bodies of mammals and birds. They must have forms that can slip about among the closely-crowded hairs or feathers; they must have means of clinging and climbing about; they must be able to obtain their food from the jungle itself or from the springs beneath its floor. In the almost total darkness, eyes are of but little use. In the ab-



WITHIN A FOREST OF HAIR—THE SUCKING LOUSE

The largest individual is a female feeding on the skin of the host. The insect shown in side view is a male, and the smaller ones are young. The objects attached to the hairs are eggs, some of which have hatched and lost the cap that permits the escape of the young

sence of exposure to the outside world, hard shells are unnecessary and a tough skin is sufficient. So, placed under such conditions, all of the dwellers in these tangles of hair and feathers have responded in a somewhat similar way and all have much in common, regardless of the diversity of their origins.

In most of them the body is strongly flattened, as in a biting louse, or compressed, as in a flea, thus permitting them to move easily through the tangle. In most of them the claws are developed as grasping organs for climbing, or some other modification for the same purpose occurs. The mouth-parts are modified to permit the biting off of bits of the growth, or to pierce through the floor into the streams beneath and suck up food. The eyes are usually greatly reduced and in many forms are entirely lacking. The skin may be entirely membranous, even if tough, and color, such as there is, is but little developed, being the yellow or brown that is normal when there is any hardening of an insect's skin.

Other curious developments common to most of these ectoparasites can not be so closely correlated with their surroundings. For some reason most of them go to one of two extremes. Either they are themselves extremely hairy or they tend to be almost hairless. In some cases the hairs are arranged in curious comb-like rows and sometimes they are extremely long. The reasons are not always apparent.

The degree to which the various ectoparasites are restricted to the particular habitat varies. Some, such as the fleas, live in these surroundings only when they are mature, their early stages being spent elsewhere. And so with some of the flies. Such forms must be able to move about either within their jungle home or outside. Such parasites are frequently more highly-colored, with harder and tougher bodies, with more highly developed eyes, than are those of more restricted activity, and in the case of some of the flies the wings are retained. The lice, on the other hand, never voluntarily leave their tangled habitat at all, and many of them are quite incapable of moving about unless provided with hairs to cling to. Placed upon a smooth surface they may be entirely helpless. Their degree of agility of course varies, but most of them can pass from one animal to another only when the cover is continuous, as between mother and offspring, or perhaps at mating time.

I have chosen here, as an illustration of this curious environment and its inhabitants, the sucking louse, *Linognathus setosus,* of dogs, which will represent an extreme of adaptation to such surroundings. Soft-bodied, eyeless, with the legs formed into claws for grasping the hairs and useless under any other surroundings, pale-colored, slow moving, spending their entire life cycle in the very depths of the tangles of hair, they are to be seen only by pushing the cover aside. Then they may be found, usually at the very bases of the hairs, with their needle-like feeding mechanism thrust into the skin. The hairs will bear, glued to them by the females, curious excrescences—the eggs—the shells of which remain long after the young have hatched. The young, upon issuing from the eggs, have merely to crawl to the base of the hairs and begin to feed.

They are a strange group, these sucking lice. At the present time only about two hundred species of them are known, and there are probably not five hundred in the world. Except for the two species that occur on man we know but little about them other than their appearance and the animals upon which they occur. They are found only on mammals, and not on all kinds of mammals at that. Placed upon a bird, with its tangle of feathers, they would probably be as helpless as on a smooth surface. They are among the most highly-specialized inhabitants of the hair environment.

The Klipspringer

By ERNST SCHWARZ

THIS little antelope is found all over southern and central Africa wherever there are mountains and rocky ground. You will meet it in Abyssinia, as well as near the Cape of Good Hope, and on the hills of Nigeria. Together with the oribi, dik-dik, steinbok, and a few more, it forms a small group of antelopes related to the gazelles.

The klipspringer is a small animal about twenty inches in height, with a thick coarse coat and short straight horns. It lives singly or in pairs. Its ability to jump, which is responsible for its name, "rock jumper", and to stand on the very tips of its hoofs, enables it to make its home in the most inaccessible mountains and on precipitous rocks. In captivity it soon becomes tame, and makes a delightful pet. The animal shown in the photograph was brought from southern Abyssinia, and lived in the

Zoological Garden at Frankfort, Germany, for a number of years, where it was a general favorite.

LET'S GO LOOK AT THE MONKEYS

To the zoo-bound citizen such an invitation usually means a visit to the monkeys, apes, baboons and others of the Order known to science as the Primates. With some exceptions (and man, of course, is a Primate) members of this Order have characteristics in common. Setting these exceptions aside, Dr. Robert Hegner gives this concise definition: "Primates are mammals covered with a hairy or woolly coat; five fingers and five toes are present; the large toe is opposable to the other toes; each finger and toe bears a well-formed nail; the eye is situated in a socket surrounded by a ring of bone; the brain-case is large and the brain is highly-developed; and the mammary glands are two in number and located on the breast."

The chimpanzees and the orang-utan belong to the Simiidae, which is the family that includes the largest and most highly-developed of the apes. Above we observe a bit of Primate gossip being exchanged in the Frankfurt Zoo, Germany, between a chimp, at the left, and an orang, both youngsters.

In the circle is a handsome Vervet monkey from South Africa, member of a monkey group sometimes called guenons. These monkeys, about the size of house cats, live in trees and travel in groups of their kind. They and their closest relatives are noted for their sooty-black faces and greenish-gray color. They are often destructive to crops in regions where they may abound close to farms.

At the left is a capuchin monkey from tropical America, and below this a mother Anubis baboon from Abyssinia seems extremely sad as she cuddles her youngster to her. Baboons travel about in groups, and their strength and powerful teeth enable them to live on the ground with other carnivores. Directly below, mother orang-utan holds her tiny offspring close, while, lower right, two chimpanzees, babies of three and five years respectively, assume an affectionate pose. All photographs courtesy of the Berlin Zoological Gardens.

The chimpanzees share with the gorillas the distinction of being most manlike. They are smaller than gorillas and more abundant. Their arms are shorter and their hands and feet narrower and better adapted for climbing. Chimpanzees live more easily and more happily in captivity than gorillas. The bright expression of the six-year-old male Cameroon chimpanzee is typical.

As though sitting in solemn judgment is the Stuhlmann's guenon below. This monkey lives in the forests of central Africa and eats both fruit and insects. It is a member of the same group as the Vervet monkey. There are many interesting species in this group of smaller Primates, and the scientific groupings are not particularly well defined.

For his patriarchal and benign expression the langur from Ceylon (above) was named "The Priest". In many districts of India and Ceylon these animals are held sacred by the natives. As a result they do not fear man and are often seen about his homes or temples. They live in the wild in the hill forests, and are equally agile on the ground and in the trees. The finest langurs inhabit the Himalayas, where they are known as the gray apes.

Some deep thought must be troubling the bald-headed chimpanzee from the forest of the lower Guinea coast. When the first chimps were brought from Africa it was thought that they were gorillas. This one has a pink face when it is young, the color becoming black in the adult. Photographs on this page courtesy the Berlin Zoological Gardens.

HAWAII BUILDS NEW AVIARY IN HONOLULU

Photographs from Pan-Pacific Press

General view of the Kapiolani aviary in Honolulu, and, above, two of its interesting avian occupants, a pair of Tantale storks from Indo-China. At the bottom of the page are parent and young of the Sarus crane, a bird of India. The aviary will house not only species native to the Hawaiian Islands but also birds of regions with climate comparable to that of Honolulu, which, of course, Hawaiian residents say is comparable only to Paradise.

Ancient ceremonials of the natives of Hawaii caused a fatal drain upon the bird life of the Islands. The feathers of many colorful birds went to make up the headgear and cloaks that were the badge of office of Hawaiian royalty and tribal dignitaries. As a result many species of birds live now only in memory or name. Others were reduced to the verge of extinction and are today being studied, protected and increased with such aid as naturalists can extend to Nature. Federal funds have been made available to supply student aids to the naturalists of Hawaii National Park and other agencies. For example, the Hawaiian goose—the nene—a bird found nowhere else, is being bred in captivity to build up the supply.

One phase of this quickened interest in bird life in the Islands is the construction of the new aviary in Kapiolani Park, Honolulu. In it will be housed rare native and exotic birds. Ornithologists are convinced that the famed climate will foster the breeding of birds, both for shipment to other parts of the United States, and for Hawaii.

Besides making the aviary a valuable and beautiful educational and scientific exhibit, special emphasis is being placed on spaciousness of quarters for the bird residents. In all cases the goal is to make the environment for the birds as close to natural conditions as possible. The aviary program has the cooperation of municipal and territorial boards and the active support of private citizens. One of the major groups aiding the project is the Hui Manu, an association of bird lovers who recall the proud history of the birds of the Hawaiian Islands and seek to restore them. E. H. Lewis, ornithologist and superintendent of the bird park on Santa Catalina Island, California, has spent a year's leave of absence in an advisory capacity in connection with the aviary.

WEEDS ABOVE THE SNOW

By E. LAURENCE PALMER

WILD TEASEL

PEPPER-GRASS

NARROW-LEAVED PLANTAIN

LAMB'S QUARTERS, PIGWEED

WILD CARROT

COMMON RAGWEED

This is the second in a series of special educational inserts prepared specially for Nature Magazine. The first appeared in the October issue and was devoted to insects of fresh waters.

MORE than twenty years ago, Dallas Lore Sharpe published an article on weeds above the snow, and started a hobby that has persisted ever since. This took the form of hunting for weeds so situated that they may be photographed effectively against a natural white background and interestingly framed.

There are many intriguing problems involved, such as where parts of the weed-tops are white and part dark; then the camera must be maneuvered so that the necessary contrasts are possible. Then, too, snow photography is rarely easy, and, since a hobbyist always plays fair with himself, and because a delicate weed-top seems always to be swaying in the wind, one has to do his weed hunting when there is good sunshine and little wind. While it might generally be possible to "fake" a picture, this is to lose part of the fun. A cattail, to satisfy the hobbyist, must be framed

HEAL-ALL

YARROW

CURLED DOCK

INDIAN HEMP, DOGBANE

MOTHERWORT

MOCK PENNYROYAL

MOTH-MULLEIN

AMARANTH, PIGWEED

CAT-TAIL

BURDOCK

CLAMMY EVERLASTING

in a background that will look like a swamp. A ragweed or a wild carrot must look as though it grew along the roadside or in a neglected field. And then, as is always true with hobbyists, comes the fun of trying to get pictures of as great a variety of weeds as possible. And there is the fun of answering the question: What is the name of that weed or where can I get help in naming it?

Anyone who becomes a weed-top hobbyist will soon learn of the rôle these plants play in supplying winter birds with their food. After a heavy snowfall, when everything close to the ground is covered, the weed tops may rear their heads still bravely above the white. Let some bird light on a pigweed and give it a shake, and a shower of excellent little fruits falls on the snow below, an ideal breakfast for a bird. It takes a phenomenal snowfall to cover all of these weeds so that the birds must starve.

The weed-seed study may prove to be even more intriguing than the facts about weed-tops. It provides one of the most interesting keys to the food habits of many birds, sheds light on the origin of a sample of commercial seed, sometimes reflects on the integrity of the seed salesman, and frequently provides an interesting clue to the early history of man. That is the way of most hobbies —we start with one, and end up with some other.

One interesting thing to do with winter weed-tops is to taste them. Try nibbling a few seeds of some wild sweet clover. At first nothing exceptional happens, but after a few minutes a satisfying sense and odor of sweet grass will fill the mouth and nasal passages. Then try a seed of catnip or pennyroyal to see how they differ. Nibble a few seeds of some wild sunflower, or, if you feel like it, try even a burdock seed. It will be surprising what flavors you can get from these (Continued on page 604)

COMMON MULLEIN

WHITE VERBENA

EVENING PRIMROSE

NAME	CAT-TAIL *Typha latifolia*	CURLED DOCK YELLOW DOCK *Rumex crispus*	LAMB'S QUARTERS PIGWEED *Chenopodium album*	GREEN AMARANTH RED-ROOT PIGWEED AMARANTH *Amaranthus retroflexus*
DESCRIPTION	Stems above ground 3 to 7 feet tall, with narrow, erect, ribbon-like leaves. Rootstocks live from year to year just under ground surface, starch-laden in fall. In winter, flower-spikes remain erect with the stamen-bearing area, above, naked. Stubble may survive fire.	Stem above ground, 1 to 3 feet tall, erect and well-branched, bearing clusters of the fruits at base of branches in winter; slender, smooth, tough. Leaves, somewhat narrowly oblong with conspicuously wavy, crisped margins, smooth, alternate, entire. Roots, large, red or yellow, taproot going underground to depth of 8 to 12 inches and sometimes 1 inch thick. Perennial.	Stems above ground, 1 to 4 feet tall and much branched, showing in winter the clusters of fruits. Smooth or powdery in appearance, with the stems often ridged or grooved to a degree. Leaves, alternate, somewhat diamond-shaped, the uppermost being linear, while the lower are rounded, toothed and more or less long-petioled. Roots extend directly into the ground. Annual.	Stem above ground, 1 to 9 feet tall, erect, branched, coarse and rough, crowded in winter with fruit-bearing clusters that persist, point upward, and are commonest at branch tips. Leaves, alternate, rough, dull green, long-petioled with wavy margins, not persisting conspicuously on winter stalks. Roots comparatively small, red, extending direct into ground. Few side roots.
HABITAT	In marshy spots where the soil is loose and fine, sometimes covering great areas but often restricted.	Open, dry, waste places such as meadows, poorly kept gardens and fields, and pastures.	Waste places and gardens, or wherever there is good sunlight, loose soil and some water.	Waste places, gardens and cultivated fields where the ground is not occupied by sod.
RANGE	Through temperate America and in Asia and Europe wherever soil and water conditions are suitable.	Throughout the United States and southern Canada. Naturalized from Europe; possibly introduced in commercial seed.	Now introduced practically everywhere man lives, although its abundance varies greatly. Native of Europe and Asia.	Now found throughout North America except in the extreme north. Came from tropical America by way of the Southwest.
CLASSIFICATION AND LIFE HISTORY	Class Monocotyledoneae. Family Typhaceae. Flowers in early summer. Pollen carried by wind from loose-spiked, staminate flowers to compact-spike of pistillate flowers just below or at a distance. One seed produced per flower but many per spike. Seedlings, grass-like. Fruits carried by wind on fluffy parachutes.	Class Dicotyledoneae. Family Polygonaceae. Flowers, perfect, with 6 sepals, the outer 3 spreading in the fruit and the inner making a sort of envelope around the 3-sided brown fruit. Flowers, individually inconspicuous, 1-fruited and 1-seeded. Stamens, 6. Fruits, pointed at one end and blunt at the other, polished. Wind-pollinated.	Class Dictyledoneae. Family Chenopodiaceae. Flowers, small, greenish, in compact clusters close to stem. Calyx, 5-parted, more or less envelop mature fruit. Petals, inconspicuous. Stamens, five. Pollination of some species by wind; others, insects, but commonly self-pollinated. 1 fruit per flower and 1 seed per fruit.	Class Dicotyledoneae. Family Amarantaceae. Flowers, inconspicuous, 3-bracted, 5-stamened, greenish. The bracts are pointed, stiff and longer than the flowers, which may appear hidden among them. Pollinated by wind or by self in July, through to September. Each flower, 1-fruited and 1-seeded. May mature seeds from seeds in a few weeks or months.
FOOD RELATIONSHIPS	Serve as a host for the cat-tail moth, *Lymnaecia phragmitella,* and a weevil, *Calandra pertinax,* the latter of which also lives on corn. Erect leaves expose a maximum surface to sun at an angle, and a minimum, when it is directly above.	Leaves bear the maggot of the leaf-miner, a fly, *Pegomyia calyptrata;* larvae of the moth, *Papaipema nitela,* which also eats corn, tomatoes and potatoes; a copper butterfly, *Chrysophanus thoe;* a brilliant beetle, and others.	Host plant for a leaf-miner; a fly larva, *Pegomyia hyoscami,* which lives between leaf surfaces; a skipper butterfly caterpillar, *Pholisora catullus;* and of interesting sucking insects.	The host plant in July and August of the stalk-borer, *Papaipema nitela,* and of the larvae of the skipper butterfly, *Pholisora catullus.*
PROTECTION AND SURVIVAL	The more or less permanent underground stems, well supplied with food and near water, insure protection from fires and other catastrophies that periodically sweep over swamps.	Rosettes of leaves in winter often large. Seeds and underground parts are hardy and endure many unfavorable conditions. Controlled by late ploughing and by frequent cultivation.	Easily adaptable to a varied environment and a rapid grower in competition with most cultivated plants; therefore, distinctly a weed. Control by cutting before flowering but seeds are long-lived and hardy. Not easily controlled by sprays.	Not a shade-lover. A rapid grower that competes all too successfully with cultivated plants for sun and water and space. Protection against cattle through tough nature and possibly the stiff bracts. Control by cultivation and burning.
USE TO MAN AND ROLE IN NATURE	Formerly a valuable source of starchy food for man; also leaves are used in making mats, insulation and rush-bottomed chairs. Leaves absorb moisture and swell; used as calking for boards; provide shelter for waterfowl. Muskrats eat roots.	The powdered root is used medicinally if harvested just after the fruits have matured. Fruits eaten freely by many winter seed-eating birds. Of some medicinal value.	Often used as a salad, particularly when young. Related to the wormseed plant, Mexican tea, beet and spinach.	Sometimes used as a salad when young. Provides abundant food and shelter in winter for many winter birds because of food-laden tops that stick above the snow.

PEPPER-GRASS *Lepidium apetalum*	EVENING PRIMROSE *Oenothera biennis*	WILD CARROT QUEEN ANNE'S LACE *Daucus carota*	DOGBANE INDIAN HEMP *Apocynum cannabinum*	WHITE VERBENA WHITE VERVAIN *Verbena urticaefolium*
Stems above ground, slender, 6 to 18 inches tall, well branched and spreading from a common erect stalk. In winter these bear a few flattened, egg-shaped fruits with thin edges that split to show seeds. Leaves, slender, usually toothed and nearly scentless, but somewhat peppery to the taste. Underground root a rather slender taproot. Annual.	Above-ground stems, 1 to 4 feet tall and well branched, coarse, and, in winter, bearing at branch-tip the split fruits. Leaves, lance-shaped but broad, pointed at each end and often showing a pinkish cast to the mid-rib; velvety, alternate and larger near the base of the plant. When fresh, the stems are more or less fuzzy to hairy, or velvety. Taproot occasionally goes to 5 inches deep. Biennial.	Stem above ground from 1 to 3 feet tall and branched at top, making the branches end in flower-groups that are either open and flat-topped, or closed inward like a bird's nest. Stem, tough, bristly. Leaves, like leafy feathers, "pinnately decompound", with strong, not unpleasant fragrance. Root, a long, deep, fleshy taproot, that may become stringy. Biennial.	Height, 3 to 5 feet, erect and branching, with elliptical, opposite, entire leaves and perennial underground stems spreading just beneath the surface, sometimes 6 feet long. With erect stems that die each year. Plants, smooth and bark exceptionally tough.	Stems above ground, 2 to 5 feet tall, erect, slender and 4-sided; almost smooth. Leaves, opposite, shaped something like one of the nettles, petioled, with margins coarsely saw-toothed. Underground parts buried to depth of about 4 inches over a square yard. Dead tops persist through winter with no conspicuous winter rosettes. Tops slender and waving.
Roadsides, gardens and waste places, frequently where the ground has been packed hard.	Waste places and gardens, preferring dry areas to those that are too wet.	Fields, meadows and waste places, usually where there is sunshine and moderate moisture.	On gravelly, waste places, or in rocky banks or beaches; generally near abundant water.	Well-watered waste grounds and roadsides, being common on exposed bars in streams.
Maine to Ontario, California, the District of Columbia and Texas, perhaps being native in the West. Native of Eurasia and comparatively recently introduced.	Labrador to Florida and west through the Mississippi Valley, with related species extending the range of the genus widely. Native of America.	Through eastern North America in particular, but found west to the Pacific Coast and there locally abundant. Naturalized from Europe.	Quebec to Saskatchewan and British Columbia, and south to Maine, central New York, Ohio, Kansas, Colorado and California, being more common to the West. Native to North America.	Now found from New Brunswick to South Dakota, Texas and Florida and elsewhere in the United States. Native of tropical America.
Class Dicotyledoneae. Family Cruciferae. Flowers, inconspicuous, with petals usually wanting, 2 stamens and a pistil about the length of the stamens, which make self pollination simple and effective. Seeds, orange brown and common as a seed impurity, expelled from fruit by explosion. Flower June through October; from seed to seed in few weeks.	Class Dicotyledoneae. Family Onagraceae. Flowers, yellow, with petals nearly an inch long and calyx tube even longer. Petals, 4. Stamens, 8. Fruit, 4-parted. Pollination by bees and by night-flying insects since the flowers open when light is not intense. Flowers, 1-fruited but many seeded. Flower through July to October.	Class Dicotyledoneae. Family Umbelliferae. Flowers, small, varying from white to roseate or yellow and arranged in an open flat-topped formation with usually the central floret dark purple to black. Pollination by insects. Fruits, like halves of flattened elongate eggs with rows of delicate spines running the length, pointed at the ends.	Class Dicotyledoneae. Family Apocynaceae. Small, white, waxy flowers, borne in pairs, bloom in July and through summer. Pollinated by butterflies to whose tongues the pollen becomes cemented and is rubbed off on some other flower. Fruits, long, slender; spindle-shaped pods, which open to free many feathery, plumed seeds to the wind.	Class Dicotyledoneae. Family Verbenaceae. Flowers, minute, white (one blue), with tubular calyx and tubular corolla, which encloses 4 stamens, the upper pair being without anthers. Flower through the summer. Flowers in loose, open spikes, pollinated by insects, each producing 4 nutlets, each like a quartered cylinder.
The host plant in July and August for the black cherry aphid, *Mysus cerasi.*	Seeds scattered by wind from splitting fruits. Not favored as food by cattle, for some reason or other.	Host plant of the root maggot of the carrot-rust fly, *Psila rosae,* and black swallowtail butterfly caterpillar, *Papilio polyxenes,* which lives on leaves.	Serves as food for a beautiful, bronzed beetle.	
Not commonly found in shade or where there is too much moisture. Somewhat sticky seeds adhere to wet animals and take up water quickly when planted. Low rosettes of many small leaves may preserve some plants through the winter. Controlled by frequent cultivation.	Sensitive to light, closing flowers when light is intense. Forms rosettes in fall.	Flower clusters definitely sensitive to moisture, opening when it is dry and closing when wet. Fall rosettes, well formed close to the ground. Protection by underground part. Leaves distasteful to cattle.	Able to survive difficult conditions because of unpalatable and persistent underground parts that cannot be destroyed easily. Enormous numbers of seeds produced should assure perpetuity, although few have the opportunity to develop into plants. Destroy with salt or cutting.	Plants protected from destruction by underground parts and abundance of long-lived fruits. Not shade lovers and must have abundance of water within reach of underground parts. Do not survive frequent burning.
Plant used occasionally as a salad and the seeds used by birds.	A related species figured prominently in DeVries' mutation theory of evolution. Plant might be an ornamental if it were not a weed. Has no economic value although by some believed to have some slight medicinal value.	The cultivated carrot has been developed from this species and this has excellent commercial and food values. The wild plant is a troublesome weed, destroyed best by cultivating and preventing seed formation. Oil used medicinally.	Indians said to have used bark as a fiber in cloth-making, as a hemp substitute. Certainly twisted dry bark makes an excellent, strong cord. Fresh roots produce a juice used medicinally. The family includes many tropical, poisonous plants	Provide cover for waste ground and anchorage for loose soil in streambeds. Controlled easily by plowing and repeated burning. Flowers too small to be thought of as ornamental, although whole plant is not unattractive.

NAME	AMERICAN OR MOCK PENNYROYAL *Hedeoma pulegioides*	MOTHERWORT *Leonurus cardiaca*	HEAL-ALL, SELF-HEAL BRUNELLA CARPENTER WEED *Prunella vulgaris*	COMMON MULLEIN *Verbascum thapsus*
DESCRIPTION	Stems, erect, branching and hairy, rarely 15 inches high and usually curving upward from a horizontal beginning. Leaves, small, blunt-pointed, narrow, sparingly toothed, light olive to green and extending up the stem to among the flower clusters; opposite. Strong odored, but fragrantly so to most people.	Stem above ground, 1 to 5 feet tall, with erect, ascending branches, and conspicuously square, relatively slender, stems. Leaves, opposite, long-petioled, not persistent in winter, about as wide as long, with deeply-cut margins, the flower leaves being wedge-shaped at base and almost entire. Fall and winter rosettes of long-petioled leaves.	Stem above ground, 2 to 24 inches tall, oppositely branched with the central stem usually the longest. Stem, square like most other mints. Leaves, oblong to egg-shaped, petioled, hairy or smooth, entire or toothed, and, in fall and winter, forming rosettes close to the ground as tangled mats. Flower clusters persist in winter at the ends of the branches.	Stem above ground, 2 to 8 feet tall, unbranched or only sparingly so; woolly, fluted and stout. Leaves woolly, light green, oblong and acute with bases extending down the stem. Seedling leaves egg-shaped, smooth and about ⅛ inch long. Deep taproot serves as anchor and helps in drought. Biennial. Stem and branches terminating in closely-crowded flower spikes.
HABITAT	In dry soil generally poor in quality and either in or out of sunlight. Best possibly in pastures.	Waste places, particularly if well-watered. Thrives in shade; among tall plants; buildings.	Lawns, fields, meadows and waste places generally; also not infrequent in woods.	Common in waste grounds and particularly in pastures, where grazing animals avoid it.
RANGE	A native American plant ranging from Nova Scotia to the Dakotas and southward, being locally abundant in this area and absent from other areas.	Nova Scotia to North Carolina and west through South Dakota and Kansas. Naturalized from Europe.	Newfoundland to Florida and westward across the continent. Native of Europe; said to have been introduced at Washington, D. C., possibly as ornamental or as seed impurity.	Nova Scotia to South Dakota, Florida and Kansas, having been naturalized from Europe. May have been introduced as a weed seed impurity of commercial seeds.
CLASSIFICATION AND LIFE HISTORY	Class Dicotyledoneae. Family Labiatae. Flowers, pale, light violet, in few-flowered whorls along the stem. Corolla, up to ⅓ inch long; upper lip, 2-parted; lower lip, 3-parted. Calyx, tubular, expanded at the base, with 13 nerves. Nutlets, 4. Pollination by small bees such as honey bees and sometimes by bumblebees.	Class Dicotyledoneae. Family Labiatae. Flowers in axils of leaves, with persistent, top-shaped calyx with 5 spiny-pointed teeth, 4 stamens; two-lipped corolla, pale purple, the upper lip being bearded. Pollination by hive bees and bumblebees. Each flower produces 4 seeds, which are shed by the wind. Fruits, crowded on stem at base of branches.	Class Dicotyledoneae. Family Labiatae. Flowers, violet or flesh-colored, rarely white, with corolla not twice the length of the purplish, persistent calyx; in cylindrical heads or short, thick spikes. Pollination mostly by bees, but self-pollination possible in case no insects make visits. Each flower 1-fruited and 4-seeded. Flower, July through August.	Class Dicotyledoneae. Family Scrophulariaceae. Flowers, yellow or rarely white, 5-lobed and 5-parted calyx and globular fruit capsule, which is crowded with small, pitted seeds. Flower from July through September, self-pollination being common, although insect-pollination is possible. Seeds distributed by being shaken from the fruits like a sling.
FOOD RELATIONSHIPS		Green currant aphids, which curl currant leaves and are a real pest, live on motherwort in the summer.		The host plant of some small black thrips, which are found among the hairs in the fall.
PROTECTION AND SURVIVAL	Favors dryness but not particular about light. Winter stems generously supplied with fruits which persist even though the leaves may wither and drop off.	Requires water, but little sun. Protected by underground rootstalk that spreads just under the surface. Controlled easily by plowing and frequent cultivation.	Aided in survival by perennial root stalk just beneath the surface of the soil. Easily destroyed by cultivation or by hoe; in some cases in lawns may be controlled by weed sprays applied when plant is dry.	Protected by hairs with a stinging property, making it distasteful to cattle, and by the rosettes, which are close to the ground.
USE TO MAN AND ROLE IN NATURE	The oil from the plant is much like that of the true pennyroyal of Europe, *Mentha pulegium*, also commonly used to repel mosquitoes. The plant may be rubbed on the skin safely.	Can hardly be justified economically and should be kept down near currants. Once believed to have medicinal value but now considered worthless.	Formerly believed to be of medicinal value particularly in curing the German *braune*, a disease of the throat. Seeds, shaken out of heads by the wind, eaten by birds.	Has been regarded by some as ornamental, but by more as a noxious weed. A sun-lover that can prosper on some wastelands not suitable for other plants. Seeds and plant believed to have some medicinal property, part as emetic.

MOTH-MULLEIN *Verbascum blattaria*	RIB-GRASS NARROW-LEAVED PLANTAIN RIPPLE-GRASS *Plantago lanceolata*	WILD TEASEL *Dipsacus sylvestris*	YARROW *Achillea millefolium*	COMMON RAGWEED HOGWEED BITTERWEED ROMAN WORMWOOD *Ambrosia artemisiifolia*
Stems above ground, to around 5 feet tall, erect, slender, rather tough, green, generally smooth or only slightly sticky-hairy. Leaves, alternate, the lower ones on long petioles, oblong in outline, with doubly toothed margins and coarse veins. Color light or rather dark green, and wholly unlike that of the common mullein. Persists erect in winter.	Stem above ground, short, leaves apparently arising directly from the roots. Leaves, narrow, prominently veined, coarse, erect or prostrate depending upon environment and season. In summer, commonly more erect. Fruit-stalk persists above the snow in winter, topped by the short, thick spike of fruits. Roots branch abundantly and penetrate ground 2 to 8 inches. Perennial.	Stem above ground, 3 to 5 feet tall, stiff, erect and branching with a conspicuously coarse-prickled surface. Leaves, opposite, long, coarse, toothed on the margins. Well-formed rosettes of prickled leaves formed at the end of the first season. A main taproot with finer side roots.	Stem above ground, 1 to 2 feet tall and well-branched at the top to make a flat-topped formation. Leaves, finely-cut and somewhat fern-like, with a strong, aromatic odor; arranged along the stem, numbering 8 to 15, and smooth or loosely short-hairy. A perennial root-stalk just under the surface of the ground with many, smaller roots. Stem, tough and fibrous, aromatic. In clumps.	Stem above ground, 1 to 5 feet tall, branching to form a ball-shaped plant body, the branches in winter ending with slender recurve-tipped, fine, naked stems, which bore the staminate flowers in summer. Leaves, finely divided and more or less featherlike, the upper being alternate and the lower opposite. Leaves do not persist conspicuously on winter tops. Roots 9 inches. Annual.
Roadsides and waste grounds generally of the poorer types, either stony or loam, mostly exposed.	On lawns, in fields and waste places of great variety.	Roadsides and waste grounds within the range.	Fields and waste places, usually where there is good exposure to the sun.	Fields and roadside, pastures and waste places; more commonly in the sun.
Rather generally established from Maine through Ontario to Kansas and south, although not universally common. Naturalized from Europe.	New Brunswick to British Columbia, and south to Kansas and Florida. Naturalized from Europe and widely spread, possibly through impurity of commercial seeds.	Maine to Virginia and west to Michigan, being naturalized from Europe. Locally common and conspicuous.	Common from the Atlantic to the Pacific, although a native of Eurasia. Fruits commonly found as weed seed impurity so may have been introduced in this way, or as ornamental.	Nova Scotia to Florida and west to British Columbia and Mexico, the northern limit possibly determined by period of frost to frost.
Class Dicotyledoneae. Family Scrophulariaceae. Flowers numerous, white, tinged with purple or yellow, with the stamens bearded with violet wool and 5 in number. Corolla open, with petals widely spread; petals, 5. Fruit in general like that of common mullein but on long stems. Seeds almost undistinguishable from those of common mullein.	Class Dicotyledoneae. Family Plantaginaceae. Flowers, whitish, small, in short, compact spikes. Pistils, maturing first, appear as whitish feathers followed by stamens, which bear anthers on long, slender filaments. Pollination mostly by wind but occasionally by insects. Flowers, 1-fruited, and 2-seeded capsule, like small boats. Flower, June-August.	Class Dicotyledoneae. Family Dipsacaceae. Flowers, blue, purple or lavender, 4-parted, with calyx-tube fastened to ovary and corolla nearly regular. Flowers in compact cone-shaped heads that flower first in the middle and mature up and down simultaneously. Pollination by insects or by self if necessary. Fruits, 4-sided with grooves on each face.	Class Dicotyledoneae. Family Compositae. Flowers in small clusters, some in the center being tubular and the outer rays either white, or sometimes red, and only about ½ as long as the bracts, which enclose the cluster. Flower from July through November. Pollination commonly by insects. Fruits, like thin, gray, long wafers blown by wind.	Class Dicotyledoneae. Family Compositae. Staminate flowers borne in crowded, slender spikes at branch-tips and well supplied with stamens; pistillate, in clusters at the base of branches. Some plants solely pistillate. Flowers generally inconspicuous. Pollination by wind. Fruits, top-shaped, small and eaten by birds or shaken out of tops by wind.
	Serve as host with other plants for larvae of some tiger moths and the buckeye butterfly. In summer, the rosy aphid, *Aphis sorbi,* which is a pest of apples, lives on this too-common weed.	Bases of the lower leaves surround the stem to form cups that hold water. This may prevent crawling insects from climbing the plants because of the little moats they must pass, although no purpose should be implied in this connection.		Host for a bronzed beetle, a long-horn beetle, *Hippopsis lemniscata,* and others. Host plant for a stalk-borer, *Papaipema nitela* (See Burdock) reported on burdock found here.
Not a shade-lover nor an inhabitant of wet places. Long blooming season, from June through September. Fall rosettes not so conspicuous as might be expected. Requires two seasons to reach maturity.	Survives a variety of light, soil and water conditions. A real pest of cultivated lands and a common seed impurity. May be controlled by frequent use of the cultivator and hoe. Seeds persist in soil for a number of years, maintaining their vitality.	Not ordinarily a shade lover. Since it is a biennial it must have protection for at least two seasons to mature fruits. Juice disagreeable to taste of cattle.	While the plants have a strong odor they are not inedible to cattle even though tough if old. Not easily destroyed by grazing because of underground parts. May be eliminated where not desired by cultivating the land or rotating the crop.	Protection by abundance of hardy fruits. Undoubtedly the pollen of this plant is responsible for much hay fever for which cures are known and preventives procurable from a physician. Plants can be controlled by frequent and early cutting to prevent seeding.
Of no economic importance and not a serious weed since it yields readily to cultivation. Fully as attractive as many plants that are grown in flower gardens.	Formerly believed to have medicinal value, being used frequently on sores. Not now so used. Seeds eaten by birds.	Easily controlled by cultivation. A related species, the Fullers' teasel, has heads whose bracts are used in carding wool.	Recommended as a forage plant in Europe. Supposed to have medicinal properties discovered by Achilles, hence the name.	Plants are probably useless to man. Fruits are food for quail, pheasants and smaller birds.

NAME	BURDOCK *Arctium minus*	CLAMMY EVERLASTING *Gnaphalium decurrens*
DESCRIPTION	Stem above ground, 3 to 6 feet tall, much branched, coarse, rough, with round, armed heads that easily break loose and become attached to passers-by. Leaves, large, unarmed, heart-shaped or rounded; larger in the rosettes, which form at end of first season close to the ground. Tap root, to 40 inches deep with smaller roots covering 150 square inches. Biennial.	Stem above ground, 1 to 3 feet tall, branched at the top and, even in winter, well covered with leaves that persist; tough and somewhat woody, white woolly. Leaves, narrow with partly clasping bases that extend down the stem. Dark green above and white beneath, covered with a felt of hairs. Roots, tough and woody with strong branching roots. Annual or biennial.
HABITAT	Common in waste places, gardens, fields, woods and roadsides where cultivation has been poor.	Waste places of many kinds, but more particularly in dry fields and meadows with poor soil.
RANGE	New Brunswick to Alabama and west to the Pacific Coast. Naturalized from Europe and found elsewhere in the world where ground is cultivated.	Nova Scotia and Pennsylvania to British Columbia and south in the mountains to Arizona and, in East, south to Ohio. A native plant.
CLASSIFICATION AND LIFE HISTORY	Class Dicotyledoneae. Family Compositae. Flowers, blue or white, in compact heads, with outer bracts making armed prickers. Heads sometimes an inch or more across. Flowers, tubular, perfect, all alike. Pollination by bees, but self-pollination, while difficult, is possible. Flowers, 1-fruited, 1-seeded, but heads many-flowered. Seedlings, with egg-shaped seed leaves.	Class Dicotyledoneae. Family Compositae. Flowers, in heads, each being tubular; the outer ones, pistillate and slender; the inner ones, perfect. This gives appearance of a yellow-centered, white flower. Bloom in August and September and produce small, light-colored, smooth fruits bearing parachutes, which are carried by wind.
FOOD RELATIONSHIPS	Flower from August through November. Host-plant for a stalk borer, *Papaipema nitela,* a moth caterpillar, which in early August is 1½ inches long, inside the stem; the Painted Lady butterfly caterpillar, *Pyrameis cardui,* and other insects in fruits.	
PROTECTION AND SURVIVAL	Able to survive varying dampness and sunlight.	Prosper best in the sunlight in dry areas. Fall rosettes of narrow, woolly leaves with even margins, clustered close to the ground. Not particularly troublesome as weeds since they yield readily to agricultural activities.
USE TO MAN AND ROLE IN NATURE	Young shoots are sometimes eaten as salad but soon become strong. Believed to have some medical value but this is little. Controlled by cutting tops during spring and early summer.	Of little value, although they make an attractive bouquet, and related species are used as ornamentals. A closely-related form has leaves that are used medicinally.

(Continued from page 599)

common weeds. Notice by looking beneath the weed whether the birds seem to show any preference, and then try a handful of the seeds that the birds favor and try to guess why preferences are given.

There are a few suggestions that it may be well to make to those who may begin making a hobby of photographing winter weed-tops against the snow. Most snow pictures are flat because of the lack of shadows. This may be due to the usual practice of taking pictures with the sun from the back. To get pictures with good contrast the camera must face into the sun or across the sun's rays. This means that in most cases care should be taken to shade the lens. With this hint you may start hunting the wild weed as it lurks in the snowbank. It is more fun than you can imagine until you get into the game, and into the snowbank too.

Weed-tops in winter may resemble the summer plants, or be decidedly different.

Insect injury provides another angle of interest in winter weed study. Many of these injuries appear as galls, such as are found on goldenrod from one end of the continent to the other. Any of these are worth investigating to see whether the creature that caused the injury is still present. In winter, some of these creatures may be in the adult stage; others, in the larval, egg, or pupal stage. Some may be beetles; some flies; others wasps, moths or representatives of other groups of insects. Some galls are made by mites and others by fungi. Some are well insulated. Some are used by more than one host and some are used more than once by a given host. All of these variations provide subjects for study by one who is interested.

ACKNOWLEDGMENTS

This article on winter weeds is modified from similar material prepared by the author and published in the Cornell Rural School Leaflet by the New York State College of Agriculture. It is used with the permission of that institution. Credit is also due Dr. Harvey Stork of Carleton College who took the pictures of rib-grass, yarrow, burdock, heal-all, curled dock, dogbane, white verbena, cat-tail and wild teasel.

One of the new residents in the aviary in Honolulu is the brown hornbill from the Philippines. This distinctive bird is a member of a large family of some sixty species found in Africa, tropical Asia and the Malay Archipelago. A notable feature is the large bill with a sort of helmet. These birds feed on fruits, reptiles and insects. Most of the species nest in tree holes. When the female is incubating the male barricades the cavity with some gummy substance, and feeds her through a narrow opening. When the young are partly grown the mother breaks out. Then the barrier is replaced, and both parents gather food for the young.

Two cranes grace one cage in the aviary, the one on the lower left being supposedly a Siberian species and the other the sacred crane of Japan. Cranes inhabit open plains and swamps. They live on young plants, bulbs, seeds, worms, small mammals, reptiles and large insects. They are among the largest birds capable of flight. Some species breed in northern latitudes and migrate to the Tropics in winter.

One look at this air plant, ***Tillandsia utriculata,*** indicates the reason for the popular name of pineapple air plant. This is the largest of this genus, which, in Florida, prefers the limbs of live oaks upon which to grow.

AIR PLANTS AND ORCHIDS

By WILLIAM J. EVANS

One need not go to the jungles of Africa or South America to see tropical orchids. A trip through any dense oak hammock in Florida will reveal many species of these interesting plants. While they cannot rival their tropical cousins in size or brilliance, they are still orchids, and possess the same general habits as their more aristocratic relatives.

The most common is the small butterfly orchid, *Epidendrum tampense.* It forms dense blankets of bulbs, roots and long, narrow leaves on the branches of many live oaks, and cedars. The bright green leaves grow outward from the small parchment-covered pseudobulbs. The flowers are on slender four- or five-inch spikes, have brownish-green petals and sepals, and a rose-purple center with white lip. The root system often spreads out for several feet along the tree branch, twining and twisting in the crevices of the tree's bark. This orchid blooms in the early spring. By late summer the oddly-shaped seed pods may often be seen hanging from the plants. A closely-related species, *Epidendrum conopseum,* is more common in the northern half of the state. The plant does no damage to the tree upon which it grows.

Spanish moss is as much a part of the South as cotton fields and cypress swamps. This odd plant is an epiphyte and is not even related to the mosses. It belongs to the Pineapple family and is known scientifically as *Dendropogon usneoides.* It seems to prefer live oak trees, but is found also on palmettos and fruit trees. It takes no nourishment from the tree, merely using it for support. Spanish moss blooms in early March. The tiny, three-petalled, greenish-yellow flowers have a slight odor.

Tillandsia recurvata is a close relative and is often mistaken for young plants of Spanish moss. This species is a small, grayish plant and grows in clumps on the sides of

Enjoying an arboreal home, the Florida tree fern, or Resurrection fern, *Polypodium polypodioides,* is found on live oaks or palmettos. During dry weather it appears to be dead with its shrivelled fronds, but let there come rain and it opens its delicate green fronds as seen below. At the lower right is the pineapple air plant. It bears its small white flowers on a bloom stalk that may be two to six feet tall.

trees, on fence posts and even on telephone and light wires. Its tiny blue flowers appear on short stems in the spring.

Popularly known as the pineapple air plant, *Tillandsia utriculata* anchors itself to its host by a mass of intricate roots. Its leaves are stiff, long and pointed and come in rosette fashion from the plant's crown. They are either glaucous or pale green, sometimes suffused with red, and are often three feet long in full-grown specimens. As this plant is usually situated high in a tree, provision

for moisture during the dry season must be made. This is accomplished by a natural cistern formed by the junction of the plant's leaves. Large specimens frequently hold more than a pint of water. The flowers, borne on long scapes, sometimes two to six feet tall, are small and white. While a mature plant may produce hundreds of tiny ones at its base for several seasons, it usually dies after one flowering. Only full-grown plants bloom.

The tree fern, *Polypodium polypodioides,* or Resurrection fern, as it is sometimes called, is often found growing on the lower parts of the trunks of massive live oaks or palmettos. This unusual fern forms dense mats on the trunks of many trees in the semi-tropical jungles of Florida. During the dry weather the fern fronds shrivel up until a casual observer might think the plant was dead. At the first hint of rain or wet weather, the leaves open and cover the tree with delicate green fronds. This fern may start at the base of a tree and grow upwards a distance of ten feet or more.

While none of these plants can be classed as rare, they are unusual enough to arouse interest among those who have never seen them in their native state.

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At the right the graceful streamers of the Spanish moss. Below, a close view of one of the pineapple air plants. Lower right, the tree-dwelling butterfly orchid in late summer, with seed pods dangling like tiny Japanese lanterns.

★ Conservation ★

A part of Nature Magazine each month is devoted to the expression of practical opinions on the vital issues affecting our use and abuse of natural resources, including wildlife, and dedicated to the purpose of assisting Americans to play a militant part in the attainment of constructive conservation aims.

★

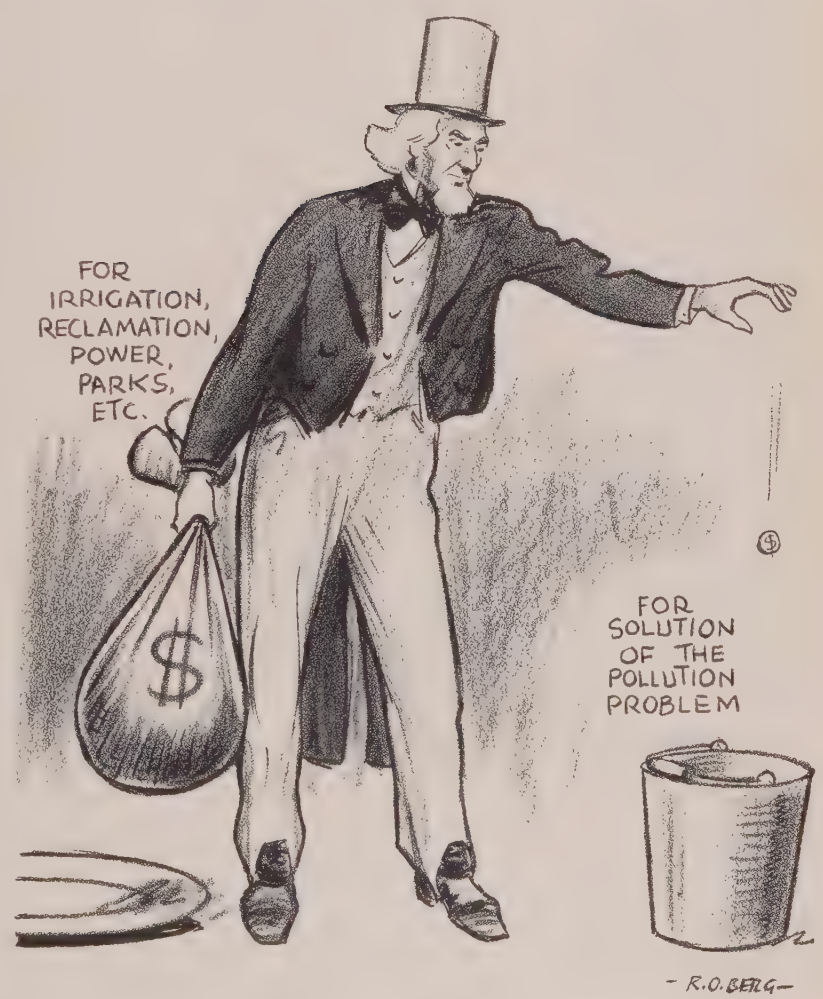
JUST A DROP IN THE BUCKET

There has been enough pussyfooting about the solution of the pollution problem. There has been enough delaying of actual accomplishment by the subterfuge of "further investigation." The facts are known. There has been enough knuckling under to the obstructive tactics of industries whose wastes pollute our streams.

A toothless pollution control bill was passed at the last Congress. It was vetoed by the President for reasons other than its ineffectiveness. So the issue still remains to be met.

Soon a new Congress will be in session. It is the responsibility of that body to face this problem and to pass an honest pure-streams law. Such a law must place the task of administration in the hands of an agency equipped and willing to apply the terms of the law. These terms must provide for enforcement.

Conservationists have the opportunity —and the responsibility—to get behind such an honest measure. Real pollution control can be achieved if they do so.



LIQUOR AND BILLBOARDS

Recently a conference was called in Washington by the Federal Alcohol Administration Division of the Treasury Department to consider the general subject of advertising of alcoholic beverages. One of the important items for discussion was the use of highway and other outdoor signs for this purpose. A joint statement was made to the meeting by the secretary of The American Nature Association in behalf of our Association and the National Roadside Council.

"We submit, as self-evident," the statement said, "the fact that signs and billboards erected adjacent to our great system of highways are offenses against the eye and against good taste. They will eventually be abated just as offenses against the ear and nose are now abated. They are parasitic, capitalizing upon the public investment in highways and the flow of traffic over them.

"More pertinent, however, to the questions before this conference is the fact that many highway officials, and others concerned with highway safety, recognize the signs on the countryside as a definite menace to such safety. Any signboard is erected for the purpose of carrying a message —usually an advertising message. The best efforts of advertising men are directed to seeing that signboards *attract* attention. Such signs, therefore, must inevitably *distract* attention from the all-important business of driving an automobile at the high speeds now permitted on out-of-the-city highways. It takes only a momentary wandering of the eye and mind to change one's destination from the next city to the hospital or morgue.

"Favorite places for the erection of signboards are on curves and near intersections. On curves the signs cannot fail to intrude on the eye, multiplying the danger at a particularly dangerous place. Near intersections, which are always potentially dangerous, the motorist may be expected to slow down and thus have more time for the distraction offered by the billboard. Such state legislation regulating billboards as has been passed thus far has taken definite cognizance of these menaces to safety caused by the rural billboard.

"Highway warning and directional signs are placed along the right-of-way in the interest of safe travel. They have to compete, however, with demands to 'Stop, Wisenheimer's Beer, Five Hundred Feet Ahead' or 'Danger! Drink Only Four Orchid Whisky. It Picks You Up.' Not that liquor advertisers are particular offenders with this type of advertising, for these devices are dangerously employed by various signboard advertisers, but there *is* a growing tendency in many parts of the country to use this imperious type of highway advertising to promote sales of beverages of varying alcoholic authority at nearby roadside establishments.

"Which brings us to a most vital question. Certainly there is no debate about the danger of mixing alcohol with gasoline. Highway authorities and courts have settled that, and now 'crack down' on offenders. But that doesn't help the sober and innocent driver who has been cracked *up* by the drunken, or even slightly muddled driver. It certainly seems idiotic to cancel any part of the efforts being made to increase highway safety by promoting the sale of alcoholic beverages through highway signboards, whether on an independently erected sign extolling the attractions of 'Jack's Place' up the road a bit, or on one of the big poster boards of the large outdoor advertising companies. Both suggest an idea that is bound to benefit the undertakers, or the bone specialists.

"It is our conviction that outdoor advertising of alcoholic beverages is definitely *not* in the public interest. We believe that this is particularly so on signs of any nature outside the corporate limits of cities. The State of Virginia, by forbidding any outdoor advertising of liquor, has led the way in this regard. We believe that such a policy should be nation-wide."

•

WILDLIFE CANNOT SUPPORT THE MUNITION BUSINESS ★

At all stages of the decimation of American wildlife—a process still in full swing—exploitation for profit has been a deadly factor. The fur industry early set the pace with the result that now most of the more valuable fur animals are reduced to mere remnants. The hide-hunters shot the buffalo from the western plains, wasting millions of animals for the upkeep of their own worthless selves and a despicable short-lived business. Market hunters had most to do with the extermination of the passenger pigeon and Eskimo curlew, and seriously reduced the numbers also of the upland plover, golden plover, prairie chicken, and several kinds of wild ducks. Contributing to these and many other onslaughts on our wildlife was the development of a great arms and ammunition industry, the propaganda of which today is the most serious hostile influence with which wildlife conservation has to contend.

" 'Business as usual' appears to be the war cry of the sporting clans, a business worth about two hundred million dollars annually, a business that will not be denied its 'rights' even in the face of disaster." (T. Lascelles, Nature Magazine, 31(6), June-July, 1938, p. 367.)

The argument seems to be much as put by the Editor of the *Wilson Bulletin*.

"1. War is still a possibility.
2. Every nation is in danger of war.
3. The United States is in danger of war.
4. The United States should be prepared to defend herself in war.
5. Arms and ammunition are necessary in war and national defense.
6. The United States should maintain arms and ammunition resources for national defense.
7. Since arms and ammunition are produced by private industry, these industries must be encouraged by the government and the people.
8. Such industries may be encouraged by the public use of arms and ammunition.
9. The only legitimate public use of arms and ammunition is in hunting and killing wild animals.
10. Therefore, it is a patriotic duty to encourage the hunting and killing of wild animals; to oppose restrictive game laws; to encourage the importation of foreign species of game birds in substitution for the disappearing native game birds, in order to provide abundance of hunting and encourage the manufacture of ammunition, etc." (36(3), Sept., 1929, p. 189).

The Editor goes on to say that in his belief "we can have both preparedness and wildlife protection and that there is no essential relation between the two problems." It may well be added, particularly with regard to Point 7, that it might be a great deal better to have the arms and ammunition industries nationalized so that they would not have to be supported by propagandized exploitation of wildlife.

As wildlife ever has dwindled and, with present trends, must continue to dwindle, it is no reliance anyway for perpetuation of the arms and ammunition industry. Must wildlife be sacrificed as a temporary prop to a structure for which it can not possibly serve as a permanent foundation?

What Is Happening To Our National Parks?

A frank discussion of the threats against the integrity of these great public reservations

By HENRY BALDWIN WARD

UNION PACIFIC PHOTOGRAPH

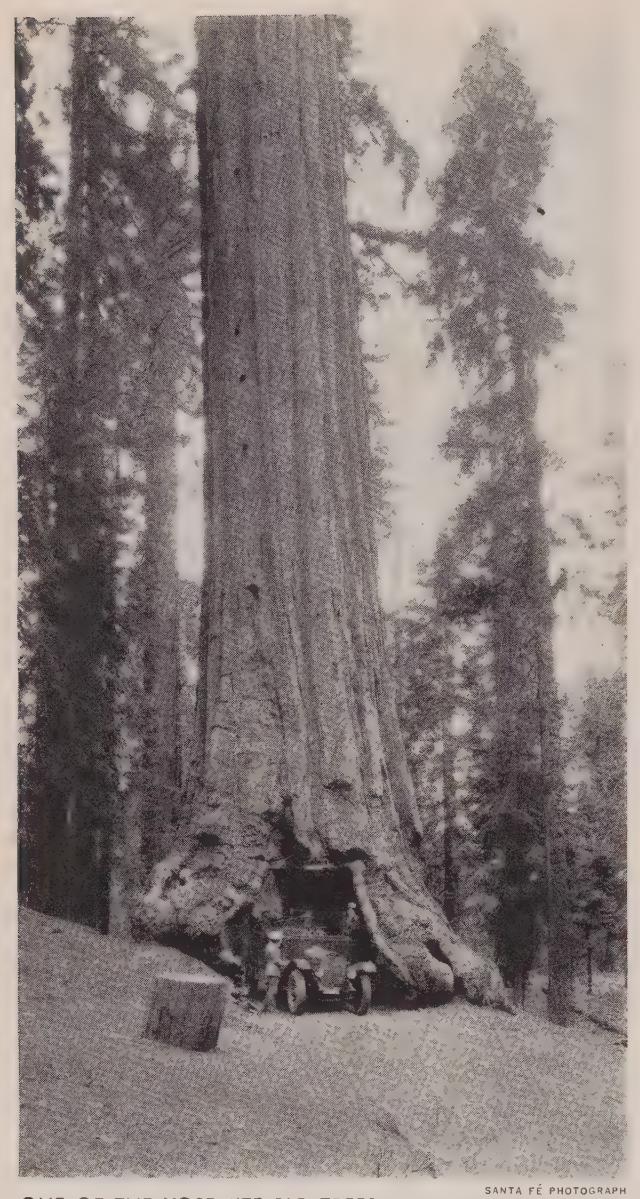
NOTHING SHOULD THREATEN THIS

However much water power it might develop, no exploitation of Yellowstone Falls, or any other of the wonders of the Yellowstone, can be justified

OUR pioneer ancestors were too deeply involved in the struggle for existence to devote much time to a consideration of the wonders of Nature. But after the colonies had become independent and the tide of population had filtered through the mountains and had begun to spread over the plains of the West, stories came back from early explorers and transcontinental caravans of the wonderful rivers and mountains, of the gigantic forests, and of other even more incredible marvels of Nature. These tales, verified by exploring expeditions, led to the establishment in 1872 of the first and still the greatest of our parks, the unrivalled Yellowstone National Park. By formal act of Congress this was consecrated to the education and inspiration of future generations, that they might know of the wilderness and its marvels as our forefathers found them.

In this action Congress gave a solemn pledge that this area would be preserved inviolate for coming generations, and the same high purpose was recognized by subsequent Congresses for more than fifty years following. During this time Yosemite, Sequoia, Mt. McKinley and other great national parks were established. These are unique, superlative examples of the scenery and of the biological and geological marvels of this continent. More recently these areas have been most appropriately designated our National Primeval Parks. They have been a source of joy and pride to our own citizens, have entranced our visitors, and have been cited in other countries as examples of the way in which splendid specimens of Nature should be preserved for all time.

Within very recent years two movements have been started that threaten the previous orderly development of this system and its protection as pledged by many Congresses and supported vigorously by a long series of presidents, cabinet members, and other public officials and leaders. At first these parks were only outlying areas, apparently of little special commercial significance. As time passed free land and other national resources were taken up and men first began to see the commercial value of these government preserves and were eager to find ways for gaining control of them. Those nearest at hand sought to secure concessions for reservoirs, water rights for power or irrigation, for mining, and many minor privileges. It was even proposed in one case to cut out of a park a considerable area for local exploitation. Not a Congress has met for twenty years, or more, without the introduction of measures providing for the assignment of rights in national parks to some particular individuals or interests. In four successive Congresses measures to give away rights to Yellowstone Lake, River, or the waters thereof, were introduced and passed by one or both houses of



SANTA FÉ PHOTOGRAPH

ONE OF THE YOSEMITE BIG TREES

The loose forest soil around the base of these giants has been pounded down so hard by tramping feet that their lives are jeopardized

Congress, only to be disapproved in the end by the then President, for that leader has always faithfully supported the nation's pledge for the preservation of these areas. The men who proposed these measures were honest and able but so firmly impressed by local needs that they rated local interests of greater importance than national values. To that doctrine we can never yield; each one of the 130 million Americans owns an equal amount—one share of stock in Yellowstone Park, and in each of the other parks and properties that belong to the nation. These rights and privileges must be protected and kept unimpaired under the control of the nation to whose citizens they belong. Individual or local interests must not be gratified at the expense of the national welfare.

These attempts to expropriate national property or rights are not abashed by the defeats of the past. One might even think they are growing. Take Yellowstone Park again. The last session of Congress had before it three measures of the same tenor: two proposed to divert Yellowstone Lake water into the valley of the Snake River by means of a tunnel through the range; one called for a survey of Yellowstone Park in order "to determine how its water resources may be used to the greatest *profit* for the country". Clearly this means the greatest profit to the promoter and his friends. A tunnel from Yellowstone Lake would doubtless yield to the favored few a profitable supply of water for power and for irrigation, and the water might be used well. But even a superficial examination of conditions in that region will show that the geysers and other unique features of the park would be highly imperiled. Any change in the water level of Yellowstone Lake would probably destroy the Paint Pots, and at least some, if not all, of the geysers.

In all of these numerous plans the fundamental danger is that, once changes are made, no matter how serious the results, "All the king's horses and all the king's men can't put Humpty Dumpty together again." The promises of the promoter are many and pleasing to the ear; his appeal is alluring as he talks even of "improving the natural beauty" of the place. But these promises are never fulfilled because they cannot be. The loss rests on the public shoulders, and that means you, and me, and the other fellow. The same promotional temperament and the same sad results are found again and again in projects for so-called better utilization of our natural resources, and it pervades all these proposals to get larger returns that today are claiming sympathetic attention in increasing numbers. The unfortunate fallacy in the arguments needs conspicuous emphasis.

A lake may be used for a reservoir, or a dam built and a valley flooded for the same purpose, and the region be made "even more beautiful," they say. But whether the water level is raised or lowered at the start, as it must be to serve the new purpose, the lake is inevitably surrounded by a marginal belt of dead trees, or bare mud and stones, or both. The aspect then is impressively desolate, shore plants are exterminated, shore fishes disappear, and deep-seated changes in the life of the area come later. The pristine beauty of that section is gone and will not return. A similar fate follows other proposed changes. When great trees are cut down or die new trees can be grown, but never the giants of the primeval forest. Some scars may be covered, but never the road roughly gouged by blasting from the face of a mighty cliff, or the tunnel with its vast mass of rock waste piled on the flank of a mountain. Hopeful and ambitious men make promises they cannot fulfill, and what is once destroyed in Nature can never be rebuilt.

Commercialism and reconstruction for profit threaten the very foundations of our National Park System. They change, to be sure, the surface of things, but they also invade deeply the conditions upon which the surface splendor depends for its very existence, and thus make the damage more far-reaching and permanent. Without elaborating the effects of these influences, it seems wise to enumerate here some of the more important lines along which human interference threatens the preservation of

THE BEAUTY AND SOLITUDE OF MOUNTAIN LAKE AND FOREST

These have a value that, once destroyed, can never be restored, and it is our responsibility that we pass on to future generations the right to enjoy such values

natural areas and the perpetuation of those masterpieces of nature that we seek to conserve for future Americans. Man's work threatens (1) by changing water levels and diverting the water supply, both serious inroads on Nature and its balances essential to the preservation of existing conditions; (2) by increasing fire hazards; (3) by destroying scenic values; (4) by creating unfavorable conditions for wildlife and thus leading to its ultimate and often rapid destruction. In these ways unique and irreplaceable wonders are lost for all time. Commercialism has no rightful place in national parks.

Certain legal rights, appropriate elsewhere, are out of place here. Thus, granting permits for mining is one such source of grave danger. It is possible that some mineral values might be found in some parks, but mining "prospects" have been extensively developed outside the parks even at places where there was no reasonable chance of finding anything of value. One who has seen the results of mining in the western mountains knows full well the devastation caused by such activity, and to permit mining in national parks (it has already been approved, unfortunately, in individual cases) means that natural conditions will be destroyed widely and the replacement of the wilderness will be impossible. Mining not only disturbs the soil and leaves ineradicable scars on the landscape, but results in destroying the game, which under the law the miner is entitled to take for his food supply. Further, mine timbers are obtained close at hand, often with serious effects on the forest cover. As miners are highly optimistic they practice the art so energetically that in any mining region the hillsides are covered with permanent scars. Certainly in any national park the purely individual gain is in no wise commensurate with the lasting public loss.

Another type of trouble arises from the presence of privately-owned areas within national park boundaries as set by Congress. This concerns chiefly the lumbering of such tracts as were privately held before the park was established. In certain national parks, also, private residences occupy conspicuous positions and park regulations cannot be impartially enforced. It would appear proper to provide that when park limits are established by action of Congress, or of the President, further commercial or individual work within these limits should be terminated and appropriate legal means be used to condemn the area involved. Only in this way can future difficulties and serious damage to the public value of the park be avoided.

Another serious situation that originates in the very attractiveness of the parks is the rapidly-mounting flood of visitors recorded. Some destruction of natural conditions can be traced clearly to the overcrowding of areas limited by natural barriers. Of the original conditions on the floor of Yosemite Park little remains today. The loose forest soil around the base of famous Big Trees has been pounded down so hard by the tramping of curious feet that the life of these giants is jeopardized. In all parks careless

visitors and trophy hunters do damage that, in total, becomes a serious loss. Methods of procedure necessitated by the number of visitors have, for instance, given the exhibit of the bears somewhat the flavor of a gladiatorial spectacle in Ancient Rome, and the beasts themselves have become sadly degenerate representatives of the noble ancestors from which they have sprung. These and other observations lead one to wonder how many people the parks can reasonably accommodate and whether the limit has not already been reached, in some parks at least. It may be that overzealous publicity has enticed too many casual visitors, not truly interested in the educational and inspirational value of the parks, who might be wisely diverted to areas of less unique and supreme value.

However dangerous to the parks this swelling flood of visitors may be, it was long ago seen to be highly profitable to the regions through and into which it flowed. States and even counties without a national park awoke to their unfortunate situation and sought a cure. Congress was subjected to appeals from all sides, and a goodly number of bills were introduced calling for national parks of all sizes and kinds in all sorts of places. In fact, this idea had already come to a few men, and the list of national parks of earlier date includes a few places that are in no respect worthy of that designation, and are likely to be transferred to some other classification when the park organization is perfected.

The error here is not unnatural. To the average man the word park suggests enjoyment, recreation merely, and the purposes approved by Congress in the establishment of our great parks are not included in his meaning of the word. Those places, private as well as public, to which the name is applied in his community and region, are devoted to recreation in the lighter sense also. That conception of a park has been with him since childhood and will stay by most men for life. For that reason I suggested many years ago the adoption of another word to designate the supreme areas. But it was not easy to find another name and still more difficult to introduce it effectively. The suggestion failed of its purpose.

How can we make the public conscious of the supreme value of our great national parks and the need of handling them in a fashion to preserve their irreplaceable features? Remember that the Big Trees antedate the civilizations of Greece and Rome; they stood on that spot as lusty saplings when Solomon was building his temple and are the oldest living things on the surface of the globe. Remember also that Yellowstone Park contains more geysers than exist elsewhere in the entire world and that these are geologically transient phenomena easily disturbed or destroyed by interference with the natural surrounding conditions. Other parks have similar unique features that call for equal care if they are to be kept for the future. Nations, communities, and even individuals expend large sums for buildings and for their maintenance in order to preserve in these museums dead things—relics of the past—against vandalism and careless or rough hands. Should we not with even greater concern protect these museums of Nature where is exhibited in unparalleled variety and splendor her work in the past? Should we permit such unique museums of Nature to be treated as mere playgrounds of the people, however important the latter may be and are? Shall we discharge our obligations to the present and the future if we fail to use every resource in our power to educate the public and to protect the nation's treasures in our museums of Nature from ignorant mishandling and early destruction?

Twenty-two years ago this responsibility stood out so clearly in the minds of national leaders that the National Park Service was created by Congress and made a bureau in the Department of the Interior. Its purpose was to maintain and properly guard these masterpieces of Nature. Mr. Stephen T. Mather, a prominent Chicago business man well known for his devotion to national parks, was made the first director. During his years of service he developed a loyal and effective organization, widely recognized by the country at large. Within more recent years the duties of the National Park Service were expanded to include various other government reservations, wisely designated by specific names to indicate their special character. Prominent among such are the national monuments, national military parks, and national historical parks. Within this recent period a large number of new reservations have been committed to the care of the National Park Service. They differ widely in character. The segregation under separate names has left, under the general name, the great parks for which the National Park Service was originally established, and also a considerable number of areas that do not correspond in their magnitude, in their uniqueness, in their surpassing character, with those original parks. Those truly outstanding areas have often been called our Primeval National Parks as befitting their character; the other group might be termed National Recreational Parks, since that is their primary purpose. So long as two groups so diverse in character and function are retained side by side, subject to the same regulations, neither can be well managed or fulfill its function effectively. Confusion will persist in the public mind, errors will be made, and disasters follow.

Evidently these two classes are not of like character, and because of their differences call for different handling. Our country in the past has been unfortunately poorly provided with recreational opportunities, especially for the average man in the average city. The movement to develop recreational areas and facilities is most desirable and highly appreciated. No one should underrate the social value of providing increasing opportunities for play and for contact with Nature. The national facilities for recreation surely should be increased, but in proper areas. Two facts stand out: first, the promotional campaign for visitors to national parks has lifted the attendance tenfold in a few years; and, second, many of the visitors have little or no interest in the educational values of the park, as they themselves readily acknowledge. Their attention is devoted to amusement and they could be easily attracted to pure recreational areas with fewer restrictions, which are irksome for the recreationist on pleasure bent.

JACKSON LAKE AND THE TETONS, GRAND TETON NATIONAL PARK

Shall we discharge our obligations to the present and the future if we fail to use every resource to protect such as this from ignorant mishandling and early destruction?

Efforts to attract the mere playboy have certainly exceeded all reasonable limits. Concessionaires have run riot in their efforts to extract a few dollars from the blasé pleasure seekers. It passes all comprehension how many unnecessary, inappropriate and even destructive privileges have been thought up and introduced into places that were set aside for wildlife preserves and dedicated to the worship of Nature. The latest printed announcement of "services at the disposal of visitors to Yellowstone Park" states: "Thrill rides on the Lake in high powered speed boats—exciting 17 mile trips *** Parties . . . taken out any time during the day or evening." Is any one so ignorant of the habits of wildlife that he imagines that deer or waterfowl will pursue the even tenor of their ways when speed boats churn up the waters? How long do you suppose bears will amble along the shore, or moose come down to feed on the water plants in shallow bays when such confusion and alarms shatter the quiet air of a summer evening? Could anything be better designed to depopulate the shores of the Lake of its wildlife?

From the outset the management of National Parks was vested in the Department of the Interior, and on various occasions the secretary of that department has proved a tower of strength in protecting the parks against insidious attacks in the past and exerting the full strength of his influence to uphold park standards. This ideal persists. The present secretary has recently met face to face the passion for building roads that has already given some regions too many highways. When Mr. Ickes published the frank statement that so long as he was in authority further roadbuilding in the parks would not be approved, he performed a real service for the protection of these areas which is deeply appreciated by all lovers of Nature. A pronouncement of even greater significance has been made public very recently. In a news release given out by the Department of the Interior and widely circulated, it is stated that the distinguished secretary of the Swedish government committee on planning and recreation, Professor L. C. Romell of Djuraholm, Sweden, had written to express his protests against the proposals made in the last session of Congress to permit diversion of waters from Yellowstone Lake. In replying Secretary Ickes pledged that Yellowstone National Park would be protected against all commercial exploitation and maintained as a model for the national parks of the world.

The only hope for the preservation of our great primeval parks for the future lies in personal attention and vigorous support of our leaders and of the public against increasing encroachment. The parks are rapidly developing increasing commercial value; the opportunity to profit from their resources is growing apace. Local needs and commercial ambitions overshadow public values and rights. What will be the result of such a course? Assuredly and inevitably these splendid museums of Nature's handiwork would lose their educational and inspirational values and become degraded to the level of local amusement resorts or of denaturalized adjuncts of commercial enterprises unless the voice of the people gives vigorous support to those leaders who are inspired to protect them against despoliation. They must be preserved against the encroachment of every form of commercialism.

In the magnificent Primeval Parks is embraced less than one millionth part of our total area. Surely such a microscopically minute fraction of our domain may be withheld from covetous seekers after personal profit and from careless hunters after individual amusement. The destruction of the primitive is all too easily and quickly effected. The primitive can never be fully reconstructed. Will men and women stand idly by without thought of Nature's priceless marvels or vision of the future need for today's inspiration, until the wilderness in its most superb development is irretrievably gone?

Deserts march forward apace
  Man in the ruin takes part;
Nature would join in the race,
  Make over the ruin men start.

Swift flies the course of destruction,
  Slow creeps the pace of replacement.
Nature knows no reconstruction;
  She only covers defacement.

Things to Think About

During 1937, forest fires burned over 21,980,500 acres, according to figures compiled by the United States Forest Service. While this represents an 18 percent decrease from the 1936 losses, it is still tremendous and largely preventable. Most significant in the forest fire report is the fact that 94 percent of the burned-over area was unprotected; in fact 11 percent of all unprotected forest area was swept by fire. Reports indicated that on protected lands 89 percent of the fires were man-caused. Improvement in roads and trails, look-out systems and fire-fighting facilities are credited with keeping fires of protected forests within more restricted areas than formerly. But the loss still goes on, and public education to proper behavior in the forest must not be relaxed.

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Effort to stabilize the Christmas tree market and avoid, or mitigate, the great annual wastage is being made in Wisconsin through the formation of Christmas tree growers into the Northland Yuletide Greens Cooperative. Members of this group would harvest their tree crops on a sustained yield basis and market them as an organization. State departments are cooperating in furthering this move.

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Both among those who hunt with a gun and those who hunt with field glasses or camera, there is some confusion as to the legal status, fundamentally, of hunting and hunted. Setting aside considerations of ethics, morals or humaneness, which affect the attitude of many toward hunting on the one hand, and the over-bearing views of some hunters on the other, it is interesting to consider just what prevailing official opinion is. We have not seen it better stated than it is under the title, "The Right to Hunt", in a release of the Iowa State Conservation Commission. We quote:

While the State holds title to all game, it may become the property of the individual when it comes into his possession or absolute control. But it does not become private property when it merely abides on the lands of the individual or when it is flying over such lands. Nor does it become the property of the hunter when he wounds it and it is still beyond his control. When game birds or animals escape from captivity and revert to their natural liberty and wildness, the title passes from the individual to the State.

Probably no single item in the law of game causes so much concern as the right to hunt. First, there are the regulations imposed by law as to the taking of game, and second, there is the right of the owners of private property to regulate the taking of game upon their grounds. The exclusive right to hunt on private grounds lies with the owner. The possession of a hunting license does not permit the holder to go upon private grounds. To do so without the permission of the owner is a trespass.

In hunting on his private grounds the owner must observe all of the regulations imposed as game laws and he has no right to violate such laws as the ownership of game does not lie with him but with the State. The hunting rights of private property pass to a tenant unless such a right is specifically reserved by the owner. A hunter has no right to shoot over private property without permission from the owner, nor has he the right to enter upon private property to pick up game that has fallen on such property, nor can he follow game from his own to other property without trespassing.

A man has the right to hunt or to permit hunting on his own ground even if it reduces the amount of game on adjoining property. He also has a right to shoot over his land even if it diverts the passage of wild fowl from the lands or waters of others.

It has been held that where one purposely leads others on the land of another in the presence of game, he is guilty of trespass even though he himself remains off of such private land. A hunter has no right to cross private ground to reach a public shooting place. When private land is covered by the water of a lake or stream, the public has no right to shoot thereon, even though they have the right of navigation.

The grant of a hunting or fishing privilege should be in writing and granting such a privilege does not prevent the owner from using his land as he sees fit, provided that he has not specifically agreed to do certain things.

Trespassing on private grounds may lead to an action for damages. A tenant may bring such action as well as the owner. An injunction may be issued restraining a trespasser or one who threatens to trespass. Where nearly all land is held in private ownership, as it is in Iowa, it is well for hunters to know not only their own rights but also the rights of others, and to give due consideration to such rights.

Iowa will be dependent upon the cooperation of landowners in the restoration of game and cooperation will depend in a large measure upon the consideration that sportsmen give to the rights of the farmer who owns the land.

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A serious forest fire hazard exists in New England as a result of the devastating hurricane. It is estimated that four billion feet of timber, largely white pine, has been blown down. Thus a condition is created that would make fire-fighting terrifically difficult. Salvage work is going on to reclaim as much as possible of the down timber, and the cooperation of all New Englanders who venture into what is left of the forests is sought to prevent a serious aftermath of the storm.

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Survey of the two areas where the pitiful remnant of our trumpeter swans nest has been made by the Biological Survey and reveals that these largest of North American wild fowl may be said to be just barely holding their own. The summer count showed 148 birds in the United States, ten less than the 1937 count. This includes cygnets. Ninety-three adult birds were counted as compared with 81 last year.

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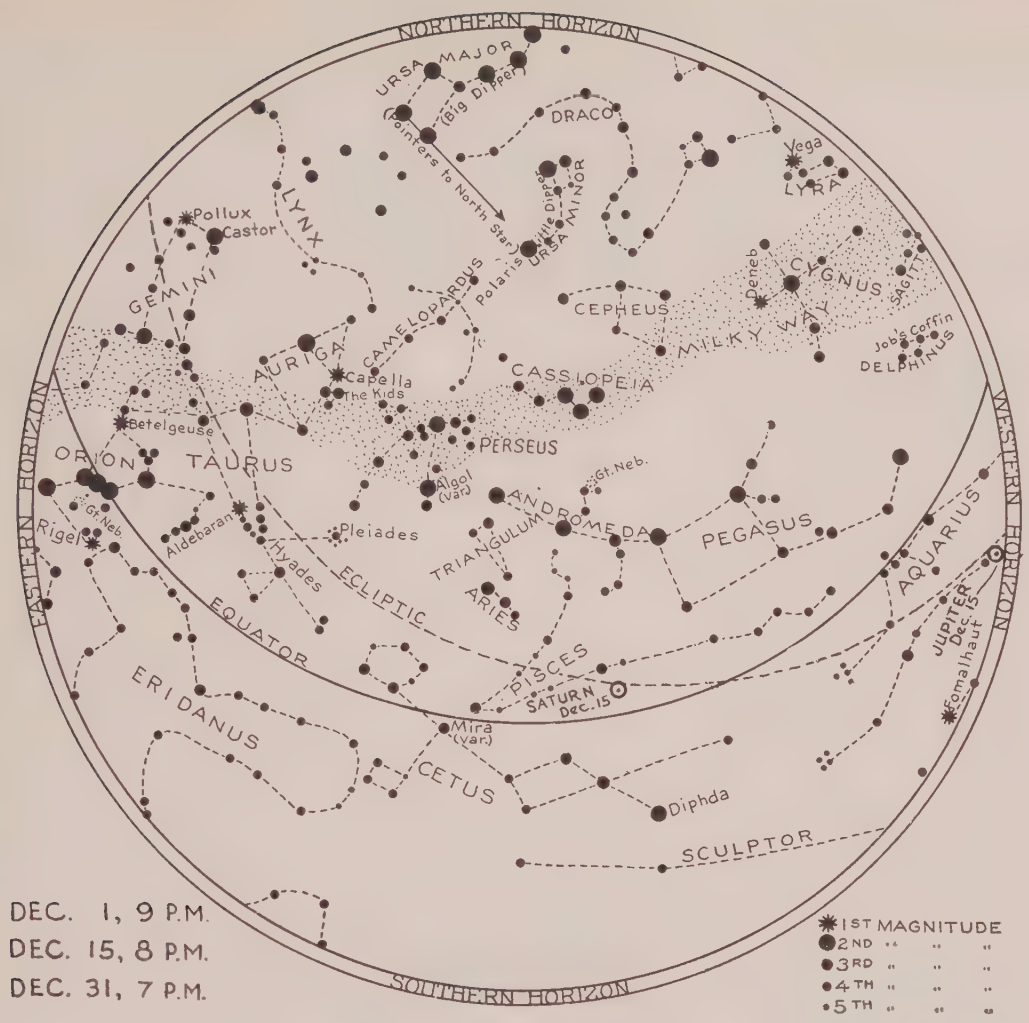
Encouraging gains in the number of big game animals in National Forests are reported. Lumping antelope, bear, deer, elk, moose, mountain goats and bighorn sheep together, the Forest Service men who made the "census" claim a round total of 1,742,000 as compared with 1,493,000 the previous year. Antelope, deer and elk have shown the most definite increases. Black bears, grizzlies, mountain sheep and mountain goats have increased little, or none.



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south.

"Lo, the Star, Which They Saw in the East . . ."

What was the Star of Bethlehem that led the Wise Men?

By ISABEL M. LEWIS

OFTEN at Christmas time the astronomer is asked whether some bright star or planet visible in the evening sky was the Star of Bethlehem, or, again: "What star was it that the Magi, or Three Wise Men, saw in the East and which heralded the birth of the Messiah?"

It is related that the Magi traveled to Jerusalem and told Herod that they had seen His star in the east and asked where He was that they might worship Him, and Herod sent them to Bethlehem, for it had been prophesied that the Messiah would be born in the city of David, and it is told in the Gospel according to St. Matthew that—"lo, the star, which they saw in the east, went before them, till it came and stood over where the young child was."

There are, of course, many who believe that the Star of Bethlehem was an apparition seen only by the Magi. In support of this view it may be said that it is not mentioned except in the biblical account. There is no mention in the historical records of any remarkable celestial phenomenon definitely associated with the birth of Christ. It cannot be said, though, that astronomers have not given much time and thought to the subject. It is possible to tell, as a result of calculations that are sometimes involved and laborious, what the appearance of the heavens was at any time in the future, or past. In this instance, however, the problem is complicated by the fact that the exact year of Christ's birth was not known. It was the Roman monk, Dionysius, who first fixed the date of the birth of Christ as occurring in the year 754 from the founding of Rome, and it is now certain that his calculations were not correct, but the date had been so generally adopted that it could not be changed. Herod's death occurred in the year 4 B. C., a well-authenticated date, and the most probable year of the birth of Christ has been accepted to be 7 B. C., though it may have been a year or two later or even several years earlier.

So a search has been made through the historical records for unusual phenomena that occurred about this time. It is established that there were, in the year 7 B. C., three conjunctions of Jupiter and Saturn. According to the calculations of the German chronologist, Dr. C. L. Ideler, the last of these was so close that the two planets would have appeared as one brilliant star. Now the Magi were priests and prophets, and as such were well versed in the art of astrology, which flourished in those times. A conjunction of Saturn and Jupiter, a rare event that occurs about every eight hundred years, had, moreover, a special meaning to the followers of Jewish astrology for it had been told them that a conjunction of Jupiter and Saturn in the zodiacal sign of Pisces would precede the birth of the Messiah. The first conjunction of the year would start the Magi on their journey to Jerusalem, a journey of several months and the third, occurring possibly on the night of their journey from Jerusalem to Bethlehem, especially if a close conjunction, might have "stood over where the young child was" and have been the Star of Bethlehem. A check on Dr. Ideler's calculations was made both by the Rev. C. Pritchard, and by astronomers at the Greenwich Observatory. It was found that, although there were three conjunctions of Jupiter and Saturn in the year 7 B. C., they were not close ones and the two planets could not possibly have been close enough to appear as one. It is still possible that even though the conjunctions were not as close as Dr. Ideler's calculations indicated they might have been the phenomenon referred to by the Magi, especially as the word star was used in a more general sense than it is today. Meteors were, even as they are today, often called Falling Stars, and a comet was a Hairy Star, or, sometimes, Star. A brilliant meteor might have been the phenomenon observed by the Magi, were it not for the fact that the star was seen both before they started on their journey and after their departure from Jerusalem.

Venus, the one celestial object most suited to play the rôle of the Star of Bethlehem, because of its exceptional beauty and brilliancy, is definitely ruled out both because it was well-known to the Magi and not an object that would have been taken as a sign of the coming of the Messiah. Also it could not have been followed all night, or even for the greater part of the night, due to its wrong position in the heavens. When in the east, Venus is seen at most for only three or four hours before sunrise.

The Star of Bethlehem might have been a comet, or even a Nova. It is known that there was an apparition of Halley's Comet in the year 11 B. C., although it is doubtful that the birth of Christ occurred that early. The appearance of a great comet was always taken as a portent of some great event, although generally of evil rather than good. The comet that bears the name of Halley, because he was the first one to establish its periodicity, has been known to return every seventy-five years from 87 B. C. to 1910 A. D. If the Star of Bethlehem had been a great comet it probably would have excited much greater attention and have been more talked about than if, say, it had been a conjunction of Jupiter and Saturn. Aside from the biblical account there is no mention of the apparition in connection with the journey of the Magi.

There is always the possibility that any remarkable and brilliant stellar object appearing unexpectedly may be a Nova. The outbursts of Novas are unpredictable, sudden, and generally short-lived. It is doubtful whether a Nova would have remained a brilliant object during the time it would have taken the Magi to travel from Media to Jerusalem, a journey of several months, although exceptional Novas do remain brilliant objects that long. But again there is no mention in the historical records of the appearance of a New Star in the heavens about that time, although such apparitions usually excited general notice and were mentioned in history.

This is all that is known of the Star of Bethlehem. As we have said, some believe it was an apparition visible to the Magi alone, others that it may have some scientific explanation and have been a true celestial phenomenon, such as a close conjunction of Saturn and Jupiter. We are inclined to believe this the most likely, knowing the significance that would have been given to that sign by those skilled in augury and astrology. Of only one thing are we certain, and that is that it was not Venus, Sirius, or any other familiar and brilliant celestial object such as we may see in our winter evening sky; and yet it is one of these beautiful and well-known celestial objects that most people have in mind when they speak of the Star of Bethlehem.

The planet Venus will be found in the morning sky this month. It is separating gradually from the sun and by the end of the month will be in good position for observation. On December 26 it will be at its greatest brilliancy. Its magnitude on the stellar scale will then be minus 4.4, and, next to the sun and moon, it is unsurpassed in splendor by any other celestial object. Venus should at that time be easily visible in daylight. Its nearest rival in brightness among the planets, Jupiter, now has a stellar magnitude of minus 1.9, and Sirius of minus 1.6. Sirius and Canopus are the only stars that have negative magnitudes, signifying great brilliancy. That of Canopus is minus 0.9. Occasionally a Nova appears that is brilliant enough to be classed temporarily among the stars and planets that have negative magnitudes, but such are rare.

Jupiter is now visible in the southwest in Capricornus during the early part of the night.

Saturn is now in Pisces and may be seen for most of the night. This is an excellent time to view the planet telescopically and to observe its rings. Mars is in Virgo, appearing in the east in the early morning sky as a red star of second magnitude only, due to its great distance at this time. Mercury will be too near the sun to be seen this month. The sun reaches its greatest southern declination at 7:14 A. M. E. S. T., December 22, and winter will then begin in the northern hemisphere.

Cotton-tail Attacks Snake

By Betty Hartz

Although the habits of our commoner native animals have been rather carefully studied, instances of unexpected behavior are likely to be observed that are most interesting to the experienced field-observer, especially if the habit is one apparently never recorded.

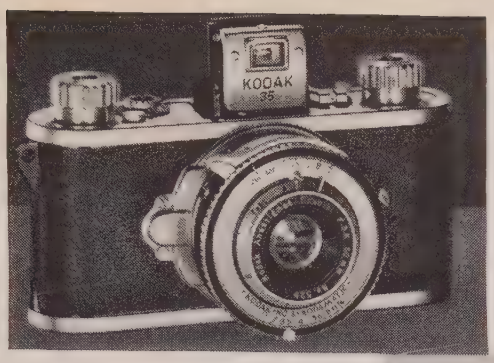
This particular instance of surprising behavior was revealed to a Nature lover on the morning of April 20, 1938, at Plummer Island, the home of the Washington Biologists' Field Club, about ten miles north of the Capitol. A member, as he approached the rustic cabin, started a cotton-tail, which rushed off for a short distance and then made a sudden stop. Although the visitor moved, the rabbit did not seem at all startled, but remained still and appeared rather preoccupied. After a few moments of hesitation, however, it came part way back until it reached a thin undergrowth. Here, it began to jump up and down, striking violently with its four feet. When the observer made a closer inspection, a pilot snake (*Coluber obsoletus*) about three feet long, was seen to twist and turn underneath the cotton-tail, as if to escape the blows from the mammal's feet. Not satisfied with this method of attack, the rabbit seized the reptile in its mouth, about five inches from the head, and shook it, but not rapidly or vigorously as a dog would do, and then dropped it. After a few more strokes with its feet, the rabbit desisted, and within a few minutes hopped away. An effort was made at once to examine the snake to see if it had been wounded, but it had slipped away and could not be found.

As a logical explanation of this scene, it was thought that the attack might have been made in defense of the rabbit's young, but none could be found.

Two months after this interesting incident, I found a pilot snake of similar size, resting motionless not far from where the rabbit had made its attack. Upon examining the snake carefully, I was surprised to find two wounds nearly healed, which probably were made by the rabbit's teeth. The snake made no effort to escape and when released, it slowly glided into a hole at the foot of a dead oak stump, evidently seeking safe seclusion for complete recovery.

Fairchild's Explorations

It is impossible, in the limited space customarily at our disposal, to attempt a thorough review of *The World Was My Garden* by David Fairchild. One of America's greatest botanists and agricultural explorers, Dr. Fairchild has lived a life of adventure in the interests of science and humanity. His travels have carried him into many far corners of the world, into danger and through thrills deriving from that danger and from the joy of discovery. And, during such a full lifetime, he has come to know other pioneers in other fields—the air, the ether, medicine. His recollections and experiences, therefore, are a part of our economic and political history, of value to be preserved as they are in this volume. Written with simplicity and humor, this autobiography is fascinating reading and holds the reader with a desire to read on to the next experience of its author. Published by Scribners at $3.75, lavishly illustrated, we believe that this book merits high placing in the non-fiction, best-seller list.



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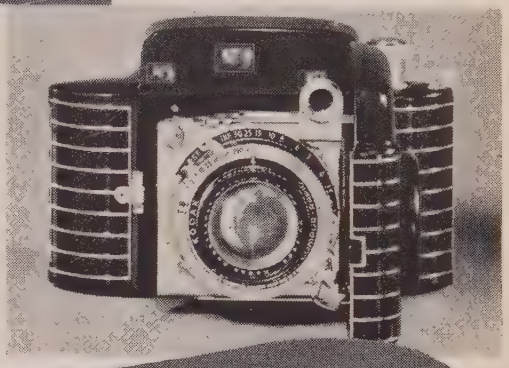

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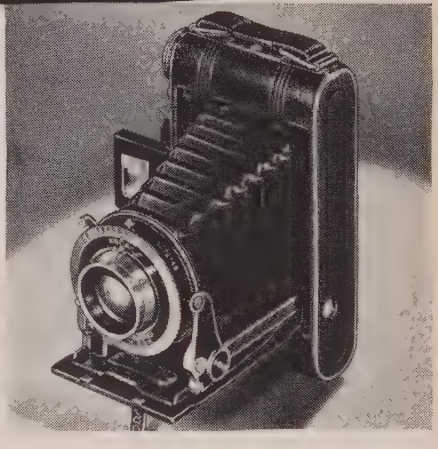

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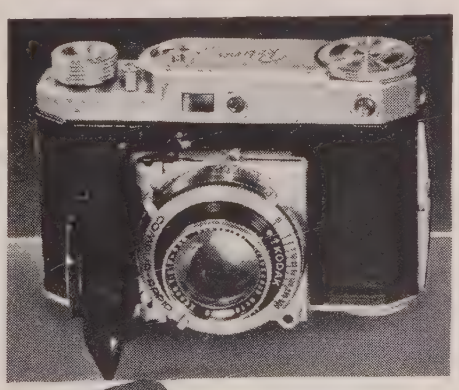

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One of our members writes in such terms that we give ourselves the pleasure of quoting. She tells us that her daughters are leaving for college, and says:

"How much richer they are because of Nature Magazine. Shelves of rocks gathered and studied; a wild flower garden; a bird bath; a bird feeding station; a window station for close observation; bird boxes in many places. . . . Snakes, frogs and insects have been studied. They watched the life of a cecropia moth from cocoon to adult. . . . A book of leaves, pressed and shellacked, with a study of the trees from which they were taken. . . . They have learned the use of the camera. They know the sky with all its changes; the sun, the moon and the weather. They have learned to *see* what is around them; to appreciate and enjoy Nature. They have something that will help them enjoy life more fully wherever they are and something they can pass on to others. May you have continued success. In this mad world of today we need to get closer to Nature, and, by so doing, get closer to God."

•

On this page last month we stated that the Trustees of Public Reservations of Massachusetts had turned over all of the thirty-seven reservations they had secured to the State. In this we were in error. Sixteen of the reservations are maintained by the Trustees, others have been turned over to the Commonwealth, or to local communities, for administration.

LOOKING FORWARD

When Nature Speaks

There is a language in the wild world. It has its own individuality, and, although it cannot be measured by human speech, it is worthy of study. Ellsworth Jaeger is a naturalist who can imitate many wild folk, and in the January issue he tells us of the how and why of Nature's calls.

Some Immigrant Ants

When Paul A. Zahl and Caryl P. Haskins put "Live Ponerine Ants" on their customs declaration they caused a mild panic among officials on the New York pier. They had been in the jungle in search of some of the most primitive of ants. Next month they tell how they got them and how they behaved.

Minerals as a Hobby

Time was when boys had collections of rocks and minerals. Today there is a trend again in that direction. Interest in geology has leaped forward, and in the January issue is an article full of helpful hints on mineral collecting.

Shorty Was a Shrew

However, he is not out of Shakespere but a friend of Vernon Bailey, one of the country's leading naturalists. Read about Shorty next month.

And Don't Forget

There will be the regular rotogravure section, the astronomy, microscope, dog and photograph departments. Also another Nature essay by John Lindsey Blackford, and Howard Zahniser's always fascinating page.

A SUGGESTION—At any time of year the gift of a Subscribing Membership in the American Nature Association is a welcome gift to any friend who loves the outdoors.

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The Guardian of the Pool

by Jean Mac D. Defandorf

Can you imagine a very lovely rock-edged pool, in the midst of an attractive garden, filled with beautiful pink and white waterlilies floating around lazily in the full glare of the noon-day sun, and surrounded by tall, leafy flowers which seem to bend over and whisper to the lilies, reflected by the cool, clear, greenish water?

Such a place is on the property of our friend, the Judge who lives near a very beautiful valley right in back of our woods. There are many huge trees in this valley and it actually makes one dizzy to look up, up, up, to the topmost branches, swaying rhythmically in the summer air. Then there is the weeping willow tree leaning over the little stream that emerges from the pool, flows thru the valley, and then frisks away into the distance.

Now, about a year ago there suddenly appeared in the pond a medium-sized bull frog, who had presumably come from Rock Creek, several miles away.

As is the case with many frogs, this one, whom we shall refer to as "Cuthbert" from now on was able to sense where he could find water even though it might be a great distance away.

Here Cuthbert had a perfect home. He liked everyone (indifference might better describe his attitude) and everyone liked him until some of the goldfish began to disappear. Then it was generally thought that the frog had eaten the fish, but my father did not think that this could be so.

Early one morning our neighbor noticed a slight commotion in the pool. To the amazement of our friend, the investigation revealed that the suspected newcomer, Cuthbert, was vainly endeavoring to swallow a dead kingfisher, which had gotten stuck in his throat. So it was not the frog after all but a bird that had been eating the fish! We think that the bird had flown to the pool to "claim his victims" when the frog, unnoticed, suddenly jumped for the kingfisher's head, pulled him under the water and drowned him.

Recently the Judge called up to tell us that Cuthbert was still on the job; he had caught and killed another kingfisher!!!

On Training Dogs

If you are a movie-goer you have more than likely seen some dog actors graduated from the Hollywood Dog Training School conducted by Carl Spitz. Buck, who appeared in "Call of the Wild", and is in the current "Too Hot to Handle", is one of these. He played opposite Clark Gable in both pictures, and Mr. Gable contributes a foreword to the book, *Training Your Dog,* in which Mr. Spitz draws upon his own extensive experience to give advice on dog education. The book is published by Marshall Jones, Boston.

Deer Not Voiceless

The deer is usually considered by the layman to be mute. Ranger naturalists of General Grant National Park, California, call attention to the fact that frequently a yearling or fawn, when separated from its kind, will wander about forlornly, making a continuous moaning sound. The tones are so light as to be practically inaudible at a distance of 100 yards. Young fawns, old enough to travel about, when thus separated from the does, will make a much louder sound than the yearlings.

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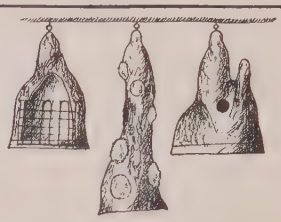

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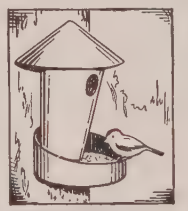

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THE SCHOOL PAGE ★★★

EDITED BY DR. E. LAURENCE PALMER

Professor of Rural Education, Cornell University, and Director of Nature Education, The American Nature Association

Biological Associates

Many of the Nature study activities suggested in books call for the recognition of individual creatures in their natural settings. We see a picture of a moose, but fail to notice what kind of trees make up the forest in the background, or whether there are lily pads on the surface of the water in the foreground. Why not devote time in a Nature or science program to recognizing associates?

The ideal exercise would deal with listing and understanding the rôle of all organisms found closely associated anywhere. This is not always practical. Neither is it always practical to expect too much of picture study when many camera pictures throw everything except a few subjects badly out of focus. Still there are simple ways in which associates may be recognized.

A boy's museum in his home near Seattle interested me because he had put associated exhibits together, not in groups of related plants and animals, but according to habitat. On one shelf he had put the things he had found below low tide; on another those found between tide marks. Still another shelf held species taken from the beach above high tide, and so on around his room. Each shelf had on it the things he had found in particular places that interested him.

Why do collectors think they must always put their finds in related groups? To be sure you can compare one butterfly with another by this arrangement, but it tells you little about where to look for the insects in the natural outdoors. If a mourning cloak butterfly, a great spangled fritillary, an early azure and a sulphur bring to mind only common or scientific names, their study has been rather inadequate. But if the sight of a monarch butterfly brings to mind jewelled crysalides hung under milkweed leaves, or great flocks of the migrating butterflies winging their way day after day to the South in fall, or weighting down the branches of trees by sheer numbers, possibly something more genuine has been gained.

It is to encourage these studies that this page is this month dedicated. In the center of this magazine is a section dealing with weeds above the snow, many of which may be available to the average reader. Most of these weeds have other organisms associated with them during their growing period. Some still provide food for winter birds or shelter for wintering insects, and a few have been dependent in the past upon insects that helped mature their fruits by assisting in pollination. Nature Magazine's *Guide to Science Teaching* will provide specific suggestions for grade placement of experiences in this field.

The studies of associates of these and other winter weeds may well begin with making bouquets of specimens collected near each other. Make one, for example, of weed tops collected in the woods. Another might well come from a swamp; another from an open field; still another from a vacant lot, and so on. While it might be best to be able to watch each of these plants through its complete life history, this will not be so necessary if the material in the charts accompanying the pictures is used. It is almost certain that any field bearing the dead tops of evening primrose, teasel, or burdock was not thoroughly cultivated during the last year. If you don't know why this is so, see if material in the charts cannot help you. What other weeds, found in your own backyard, can give you a similar understanding of their background? The presence of these weeds in a garden tells much of the practices of the man who possibly considers he has that land under cultivation. It helps to understand a biological association.

In the upper grades, where work is being done in geography, worthwhile studies of associates on a broad scale may be made by drawing maps showing the distribution of the common weeds found locally. This will show the ones that have the broadest distribution, and which, because of this fact, probably are to be found elsewhere in the world with vastly different associates. The chart material on the winter weeds gives guidance in the study of some of these weeds from this angle.

It will be particularly interesting to notice from which continents these weeds originally came, and to try to learn what factors lead to their distribution. It should be noticed that many of the weeds derived from Europe mature their seeds or fruits at the same time as do those plants that farmers sow in their fields. Because of this many weeds were brought in as impurities in seed stock. If this line of thought proves interesting, it may well be followed by studies of the kind of weed seed impurities to be found in commercial seeds available for study. An excellent bulletin on this subject for use in schools may be had by writing to the United States Department of Agriculture in Washington. Some of the associations of plants found in these seed collections may be unnaturally grouped because of mixings made by man, but they may be none the less real.

Not infrequently winter weeds furnish excellent records of associations that have not always been mutually helpful. In swamp lands many weed tops may show the dead plants of the parasitic dodder. Then, too, innumerable winter weeds have conspicuous swellings or galls caused by insects, mites, or other organisms. Most of these are worth investigating, since they show how some of the causal organisms provide themselves with protection from the severe winter weather at the expense of the host plant. Rich finds should be made by anyone willing to visit a patch of goldenrod, cattail, or a grove of oaks. Each of the galls of a given type is made by a particular kind of creature, so that one who knows can identify the creature found inside without close examination.

Not a few of these galls will have been recognized by birds as sheltering a food supply, and some of them will have been opened for the lunch they provide. Some of these galls house more than one kind of tenant; one kind being responsible for the house, and the other merely moving in and occupying it because of its convenience. One of the best known of these galls is the one found on willows, and looks much like a small thick pine cone.

Weeds provide winter food for many creatures associated with them because of the green rosettes that many of them maintain close to the ground. Some of these are edible and may be obtained by pushing the snow away. Small animals, like mice, find that winter is a favorable time for them because when the snow is deep they can remain close to the ground where there is an abundance of green food, and yet be protected from their enemies above by the blanket of snow.

A study of winter weed tops also contributes to the study of biological associates because in most cases the tops that persist in fields where cattle have lived, are of species not favored as food by the cattle. This may be due to unpleasant juices, hairs or prickles, to toughness, or to other reasons. The more edible kinds will not have lived to flaunt their tops above the snow. Which of the tops available for study fit into this picture?

Of course many biological associates are brought together by the fact that they share the same requirements for air, water, and soil. Those that can survive immersion in water do not grow with those that can survive drought normally. The water associates may in many cases be studied in winter as in summer, since few waterways freeze solid, and free water is commonly available under the ice. Spring-fed waterways may change their temperature little during the twelve months, and as a result such springs will vary little in the living things they support through the year.

The chemical nature of the water may dictate the associates it supports, whether this water is in the soil or free. The life of a salt spring differs from that of a lime spring, or a sulphur spring, or of a spring in which the water is relatively free from these chemicals. Knowing this, one may almost assume that any conspicuous variation in the living things found in two places that may appear to be alike superficially may be due to the chemicals dissolved in the available water supply.

The studies so far suggested may seem relatively simple, but carried on wisely and applied intelligently they have led to such practical things as the discovery of oil wells, of salt mines, of mines of gold and of diamonds. They have made or ruined farmers and real estate men. They have provided the basis for most of our modern medical practice, which depends largely on how one particular animal gets along with the plants and animals with which it must be associated under modern conditions.

It is true that the study of individual plants and animals has its place, but it is a relatively small place in the whole field of the study of Nature.

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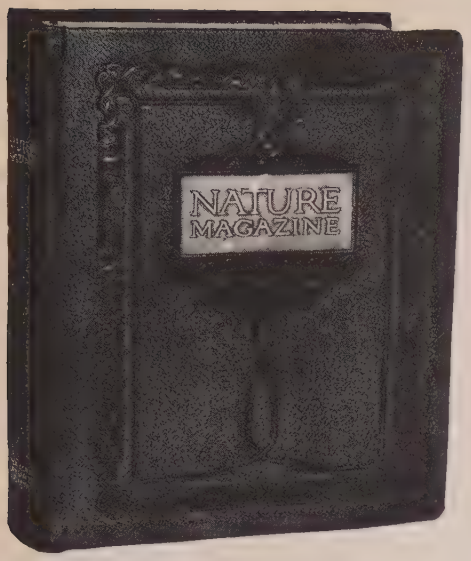
Copies of Volume 1, Number 3, of The American Nature Association *Quarterly Bulletin*, being a report of a survey of the field of conservation education, together with a discussion of public sentiment, present activities and sources of information, is available to all members of The American Nature Association on request.



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Useful Trees and Shrubs

This is the title given to a set of five hundred cards compiled into a file by Florence Bell Robinson, assistant professor of landscape architecture at the University of Illinois. The cards contain descriptions of hardy woody plants in common use for ornamentals, together with data particularly valuable to the landscape architect or the nurseryman. Space is left on each card for further notations of personal experience. Variation in the color of the cards denotes deciduous trees, deciduous shrubs, conifers, broad-leaved evergreens, and vines. The cards are filed by these groups alphabetically by Latin name, to some degree limiting their usefulness to the professional. There is an excellent idea in this set for less professional sets of cards covering trees, shrubs and flowering plants, cross-referenced for the use of the lay garden enthusiast. The card set is brought out by The Garrard Press, Champaign, Illinois, and sells for $4.50.

Southeastern Ferns

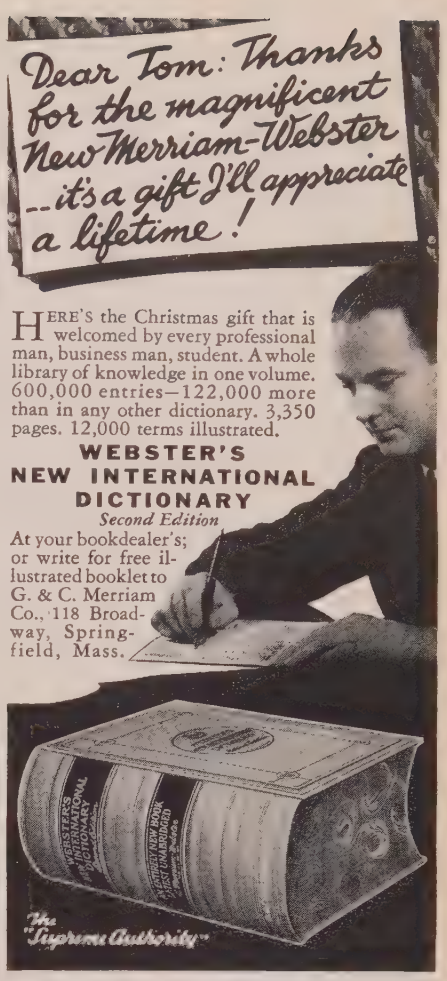
Published posthumously, *Ferns of the Southeast* serves as a reminder of the splendid botanical contributions made by John Kunkel Small. In this present volume we have a work that is not only of use to the advanced student of ferns, but equally valuable to the beginner. In it 196 species are described and illustrated, thirty of which have not before appeared in any book on American ferns. Although originally intended to cover the ferns found south of Virginia and Kentucky, actually the range of the book includes most of the species found in the East. Besides the illustrated descriptions, a visual key is included in the volume, and directions for cultivation of wild ferns are provided. This volume is brought out by the Science Press, Lancaster, Pa.

Barro Colorado Again

Somewhat as a sequel to his earlier, popular *My Tropical Air Castle,* Frank M. Chapman writes *Life in an Air Castle,* giving more of his experiences and observations at the tropical research station on Barro Colorado Island, Panama Canal Zone. This book is devoted to interesting stories, entertainingly told, of the exotic birds and mammals of this region. This large island in Gatun Lake is a paradise for the naturalist seeking tropical wildlife and Dr. Chapman has overlooked no opportunity to study that wildlife. Published by D. Appleton-Century, the book sells for three dollars.

The Right Quotation

The American penchant for days and weeks dedicated to some special idea, or cause, or memorial, is one that seems never to flag. This being so, many spoken and written words are devoted to such occasions. In recognition of a demand that must, therefore, exist, Maud Van Buren has compiled, and the H. W. Wilson Company has published, a book entitled *Quotations for Special Occasions.* In it you can find just the thing to say about Mother's Day, Arbor Day, Conservation Week, Safety Week, Bird Day, Christmas, Flag Day and many other national holidays or "weeks" proclaimed by custom. The volume sells for $2.50.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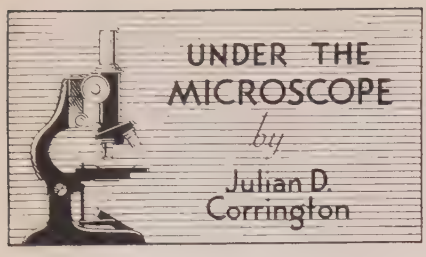


Centennial for Microscopists

One hundred years ago there occurred one of the most significant events in the entire history of biology—the announcement of the cell theory by Schleiden and Schwann. The dates are 1838-1839 and so we have chosen the last issue of 1938 as an appropriate one in which to review some of the facts of this revolutionary discovery, now thoroughly established and known as the cell doctrine.

The term cell has frequently been declared an unfortunate misnomer, as it implies a sort of empty box construction and places the emphasis on the cell wall instead of the contents. However, it came about in a perfectly understandable way through observation of the heavy and conspicuous plant cell wall in dry and dead tissue. The English microscopist, Robert Hooke, in 1665 cut a thin slice of cork with a penknife and, inspecting this subject through his microscope, described it as composed of "little boxes or cells distinguished from one another." Malpighi, Grew, Leeuwenhoek and other pioneer microscopists made excellent drawings of plant cells, but did not see in them any underlying principle of organic construction. Malpighi termed them utricles, and said that plant tissue was a result of their union, an observation vaguely foreshadowing the cell theory.

A close approach was made by Wolff in 1759 when he generalized on the development of plants and animals, stating that each organ is composed at first of a clear semi-fluid mass, in which later appear many cavities. If these remain round or polygonal they become the subsequent cells; if they elongate they form the future vessels. Here, in spite of obvious errors, is nevertheless the germ of the correct idea.

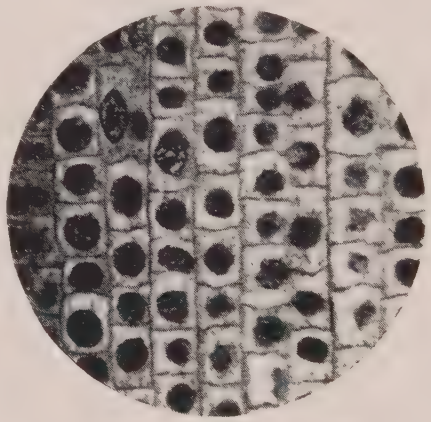
Insufficient consideration was given this brilliant observation because of the overawing influence of the physiologist Haller, who had stated that the parts of animals and plants were either made up of fibers, or of unorganized concrete, thus giving rise to the fiber theory that held sway until nearly 1800, being finally replaced by the globule theory. This latter view, championed by many observers, argued that organisms were composed of globules and formless matter, and we now recognize many of these "globules" as the cells known today. Thus ran the current belief one hundred years ago. In 1831 Robert Brown discovered the nucleus in plant cells, the last important contribution prior to the cell theory itself.

The two men whose names are immortally linked with the announcement that all plants and animals are composed of cells were of very different background. Matthias Jacob Schleiden (1804-1881) trained for the law at Heidelberg University and practiced in Hamburg, his native city, but at the age of twenty-seven he yielded to his strong inclinations to study natural science and went back to university life for instruction in this field, studying at Göttingen, Berlin and Jena, graduating from the last-named and going back there as a professor in 1839, remaining until 1862. He did little active research after 1850.

Among botanists Schleiden is noted as the author of a revolutionary textbook of the subject (1842-3) which threw overboard the time-honored style of dealing solely with plant classification and species naming, but instead took up structure, physiology, development and other chapters of basic importance after the fashion of modern treatises. His ideas on cell division were erroneous, yet they led Schwann to the conception of the cell theory.

Theodor Schwann (1810-1882) attended the University of Würzburg and then became an assistant at Berlin, in both places coming under the influence of the great Johannes Müller, outstanding biologist of the time. Later Schwann taught at the Universities of Louvain and Liège and was highly thought of as teacher and experimenter.

Schleiden was acquainted with Schwann, and it is related that while the two were dining together in October, 1838, Schleiden discussed his observations and theories on the plant cell. Schwann was struck by similarities to preparations of his own on animal cells

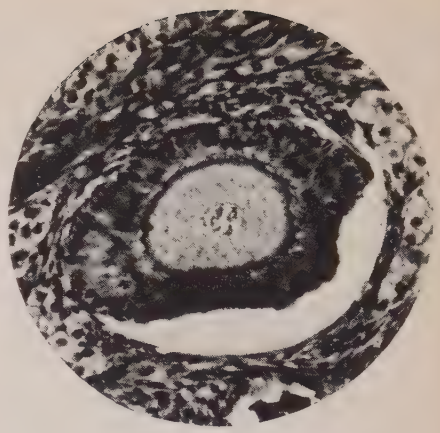


TYPICAL PLANT CELLS, FROM ROOT TIP OF ONION. CELL WALL, CYTOPLASM AND NUCLEUS ALL SHOW CLEARLY

(SLIDE BY WARD'S, ROCHESTER)

and together they went to Schwann's laboratory, where he showed his friend sections of the spinal cord under the microscope. Schleiden promptly noted the nuclei and stated them to be similar to those he had been studying in plant tissue, thus giving Schwann the idea that plant and animal cells were fundamentally similar.

The rôles played by these two men in founding the new theory were very unequal, Schleiden's part being much the less important. His paper, published in 1838, dealt with the question of origin of new cells, which he conceived as arising inside the old cell instead of by the division of one cell into two, a phenomenon universally studied today in elementary biology under the term mitosis. Schwann adopted this error, relying upon his colleague's research, and yet this did not prevent him from reaching the correct generalization. Schwann's first paper, 1838, was a brief announcement of the cell theory, followed in 1839 by the full publication under the title *Microscopical Researches into the Accordance in the Structure and Growth of Animals and Plants.* This book, in German, was an octavo of 215 pages and four plates of illustrations, and ranks as one of the great classics in biology.



TYPICAL ANIMAL CELL (WHITE OBJECT IN CENTER); EGG CELL IN SECTION OF CAT OVARY

(SLIDE BY WARD'S, ROCHESTER)

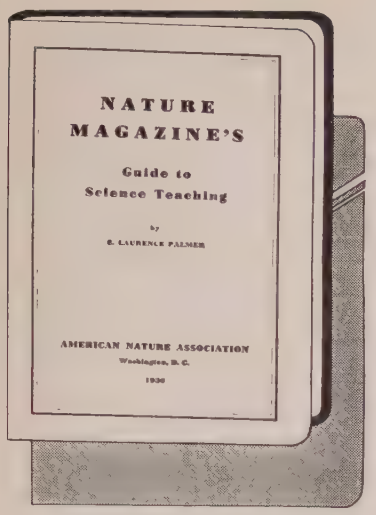
Conceptions as to the nature and development of cells have been profoundly altered in the century since Schwann's revolutionary publication, yet this basic work was necessary for further advance. Pioneering researches are almost always full of errors, which later refinements gradually erase, but are nevertheless far greater in value than the many individual corrections, since they point the way along the laborious road to truth. The cell is now a commonplace but its importance grows with each new advance, whether the investigation be along the line of structure, function, development or heredity. The cell is the fundamental unit in all of these studies.

National Society Plans

Response to our proposal in the October issue that all readers interested in microscopy band together and organize *The American Society of Amateur Microscopists* has been good but, we regret to report, not good enough at the date of this writing. We sent out five hundred of the questionnaires and as fast as these have been returned, sent others to those whose names were given as persons likely to be candidates. In addition a fairly large number of requests for the questionnaire have come in from enthusiasts not before known to us as possible material.

The number of replies, however, falls considerably short of what it should be to justify such an organization, or going ahead with further plans. Hence this last appeal to see if we may yet arouse a sufficient amount of interest. Several previous attempts along this line have been made in this country, but they have failed; a magazine devoted to this field was started, but had to discontinue from lack of support. This will be the last such chance for probably a number of years to come. Please act promptly if you have any concern in this proposition, and return your questionnaire. If you do not have one, drop us a postal card and a copy will be sent immediately.

We are afraid that perhaps the word *Amateur* in the title has deterred some, particularly teachers and others who use a microscope more or less regularly. This word is entirely proper, and, in fact, imperative in the title. Do not overlook the correct definition and the fact that an amateur may be as expert as any professional and is in no sense a beginner, a bungler or an inexperienced tyro. One of the greatest microscopists of all time, Antony van Leeuwenhoek, was an amateur and proud of it. The



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editor of this department, along with the thousands of professors of biology and other sciences in our colleges and universities, and notables like Schleiden and Schwann, featured this month, is an amateur microscopist, and likewise unashamed of the designation.

Last call! Everybody out!

Photomike Contest

Owing to an insufficient number of entries, no prize is awarded this month. All photographs received to date will automatically go into the January contest, along with those submitted between the dates of October 15—November 15. Get busy, you photomike fans;—we need more entries to make it a real contest.

Christmas Approaches

Have you an amateur microscopist in your home? Among the friends and relatives on your Christmas list? If so, nothing could be better calculated to bring that desired state of joy on Christmas Eve or Morn than some gift connected with this beloved hobby. Be he or she young or old, inexperienced or advanced, there are many articles and accessories to suit all conditions and price range. Here are some suggestions for your shopping list:

Microscopes: perhaps the giftee is an enthusiast but does not yet own a microscope, a condition we found to be true in many of the replies to our recent questionnaire. A first-class instrument may be obtained in the following price ranges: $14.50, 20, 38, 50, 70 and up. No gift could be more deeply appreciated or give more lasting pleasure and education than this. If you are considering such a purchase and wish advice, write to Dr. Corrington, giving as many particulars as possible. State the age, sex, training and future aims, as far as known, of the recipient, and the price range you would consider. Suggestions will be sent promptly and catalogs supplied from the various manufacturers. Or, if preferred, write direct to the makers and request their literature.

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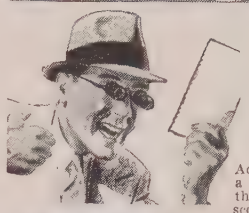

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Year subscription to the magazine *The Microscope* (reviewed in October issue), Harry Ross, 82 West Broadway, New York City; $3.00.

Beginner's Primer

Unless the beginning microscopist narrows his interest at a very early stage, which is not advisable, he is certain to do at least some work with insects. For this reason he should learn something of the main principles of insect classification and be able to tell at a glance the Order to which most of the specimens collected can be assigned. This primary classification is easier than with many another animal group and is concerned with three characteristics, the wings, mouthparts and metamorphosis.

Wings vary in number, size, shape, composition and venation. For example, fleas have none, flies one pair and dragonflies two pairs; in wasps the two wings of a side, front and rear, are alike in composition, while in beetles the forewings are modified into heavy cases to protect the delicate membranous hind wings; butterflies have the wings coated with minute scales, bees do not.

The mouthparts of grasshoppers or beetles offer interesting study because they include heavy mandibles and are fitted for chewing, while those of bugs and mosquitoes are tubular and arranged for piercing-sucking. In the housefly the mouthparts are adapted for sponging, while those of the honeybee play a dual rôle and can either lap or chew.

Metamorphosis refers to a radical change in the construction and appearance of the animal during its life cycle. Fish moths have none, the young being merely smaller replicas of adults, and the life stages are egg, young, adult. Grasshoppers have an incomplete metamorphosis, the young stages resembling the adult but differing in parts, proportions or degree of development; for example, absence of wings. The stages are termed egg, nymph, adult. Butterflies hatch from the egg into a creature, the well known caterpillar, which does not at all resemble the adult, and which is fitted for an entirely different kind of life and environment. The stages in this complete metamorphosis are egg, larva, pupa and adult. The larva or caterpillar—so frequently but incorrectly called a "worm"—has chewing mouthparts and no wings or reproductive organs. After feeding voraciously and attaining full size by a series of molts, it goes into a quiescent stage, the pupa or chrysalis or cocoon, in which some of its structures are torn down and the creature made over again into a winged adult with fully developed reproductive system and sucking mouthparts.

The larvae of those insects that undergo complete metamorphosis have been given characteristic common names, as in the case of caterpillars. Those of flies are called maggots, while the larvae of beetles and the bee group are termed grubs.

By combining a description of these three basic characters—wings, mouthparts and metamorphosis—most insect orders can be determined without much difficulty. Next month we shall continue this discussion by listing and defining the chief orders.

Advanced Hints

For those who have passed the elementary stage in microscopy but who are not yet fully versed in advanced technique, one of the best and most interesting mounts that help one to gain some dexterity and skill in this work is the mounting of the stinging apparatus of the honeybee. To prepare such a mount proceed according to the following schedule:

1. Kill several worker bees in a cyanide jar and place them in a vessel of tap water for 24-48 hours. This is to soften the specimens just enough to facilitate further steps.

2. Working on each specimen separately hereafter, grasp the protruding sting with forceps held in the right hand and pull gently, at the same time pressing lightly upon the bee's abdomen with the left forefinger. This should expel the stinging apparatus intact, but breakages are frequent, even with experts, so use as many bees as necessary to obtain a perfect specimen. This should show a large bag, the poison sac, from the upper end of which extends a long slender tube, dividing in two some distance from the sac, and termed the poison gland. At the lower end, the sac is continued as the poison duct and runs between two barbed darts, those structures which inflict the actual stabbing. These are operated by levers and muscles and are guided by a pair of finger-like sting feelers. Reject any imperfect examples.

3. Fix for one hour in 10% formalin. Prick the poison sac with a needle to insure penetration of the fixer.

4. Wash in running water for one hour.

5. Stain in dilute eosin or light green for five minutes and examine with a hand lens. Stain longer if too faint, but avoid intense colors.

6. Wash in several changes of tap water until excess stain no longer comes away from the specimen.

7. Dehydrate through 50, 70, 85, 95 and 100% alcohols, ten minutes each.

8. Clear in xylol, ten minutes. Or pass from 95% alcohol to carbol-xylol and then into pure xylol.

9. Swim the preparation onto the center of a slide, in xylol, and arrange so that all parts are symmetrically displayed without overlapping. Tilt slide carefully to drain off excess xylol.

10. Mount in balsam with thin cover glass props. Several trials may be necessary to obtain a perfect mount, but the experience is very valuable.

Trade Notes

Harry Ross, 82 West Broadway, New York City, is a dealer in scientific and laboratory apparatus of many types, including used and reconditioned microscopes, guaranteed to be as represented. His illustrated literature advertises a great many science items, including ultra violet and polaroid outfits and miscellaneous accessories, and provides the best simple explanation of polarized light we have yet seen. A set of his sheets will be sent you on receipt of a three-cent stamp. Address Julian D. Corrington, this department.

* * *

A beautiful gift volume of eighty remarkable photomicrographs, edited by W. Watson-Baker, has recently appeared from the Studio Publications, Inc., 381 Fourth Ave., New York City. Diatoms, radiolaria, foraminifera, plants, insects, fossils, crystals, steel and many other subjects are included. The book will serve as an inspiration to the photomicrographer, nature student, microscope hobbyist and teacher as well as to artist and designer. $2.50.

* * *

Among the most remarkable and interesting of modern methods in biology is the study of living cells and tissues, removed from the bodies of higher animals and grown as cultures *in vitro* (in glass containers). Pieces of heart muscle, skin, liver and so on are taken from a young chick or other subject and transplanted to various depression slides containing nutritive and sterile solutions. Both normal and cancerous tissues may thus be observed under the microscope in the living state, and a great deal of new information has resulted.

The advanced student who would like to try his hand at this type of work will welcome a manual describing materials and procedures, *Tissue Culture Technique,* by Gladys Cameron. While not for the novice, those who have had some training in slide technique, manipulation, and preparation of formulas may well undertake at least some of the suggested experiments. Farrar & Rhinehart, Inc., 232 Madison Ave., N. Y., $3.00.

* * *

Keep your microscope covered when not in use. Dust is the enemy of the microscope; put it away in its case or cover with a black cloth hood or glass bell jar.

* * *

Would you like to have a pointer in your microscope so that a particular object in the field may be shown to others? Remove the eyepiece and unscrew the eyelens—that nearest the observer's eye. Part way down in the interior of the ocular will be seen a projecting circular shelf—the *eyepiece diaphragm*—the point where the image produced by the objective is brought to a focus. Place a single hair across this shelf and cement in place with a tiny drop of balsam at each end. When dry, cut the hair in two at the center and remove one half. Replace eyelens. In observing objects, this hair appears to lie in the field of view and the end may be placed exactly upon some particular feature you wish to point out by manipulating the position of the slide and by rotating the eyepiece so that the pointer swings around to different locations.

* * *

Under the Microscope is a department of NATURE MAGAZINE designed for those readers interested in microscopy and maintains a service to render assistance with problems in this field. You are invited to take advantage of this service. Address all inquiries to Julian D. Corrington, NATURE MAGAZINE, 1214 Sixteenth St., Washington, D. C.

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(Continued from second cover)

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Of course many people have not the time to devote to dogs in order to achieve the best results in dog-companionship. But, that's another story! Dogs need time given to them, and care and thought and affection, just as children do—even as garden flowers do.

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